

HYDRAMASTER

Corporation
11015 47th Avenue W, Mukilteo, WA 98275

MAXX 450D/470D/ 450 Diesel

Machine Serial Number _____

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Mukilteo, Washington

MAN-182-047

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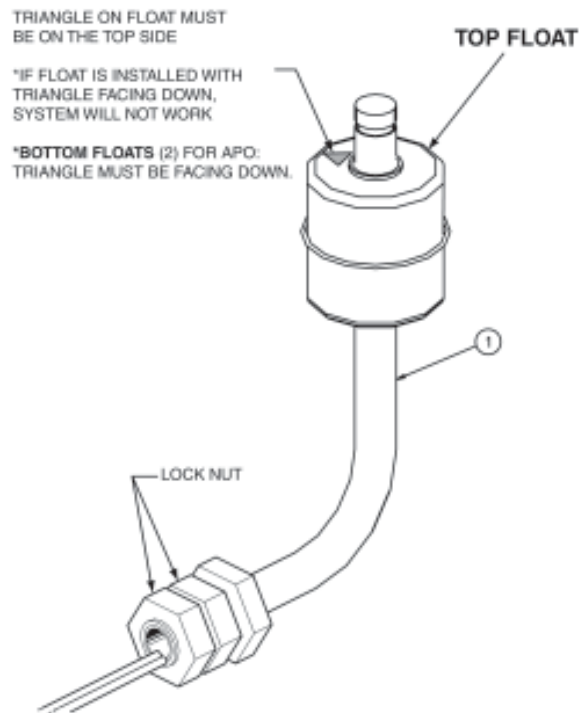
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Quick Reference

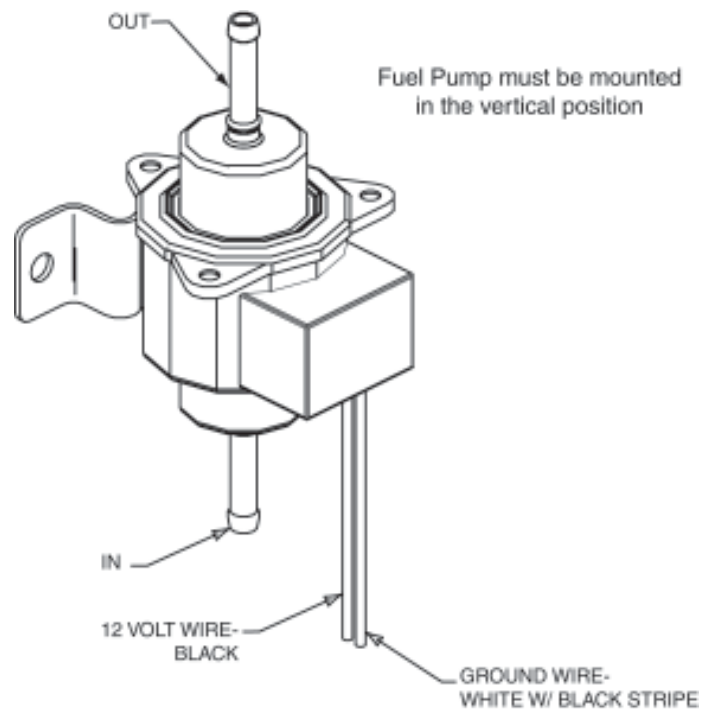
Recovery Tank Float Switch-Top Float Shown

B4624 Rev—

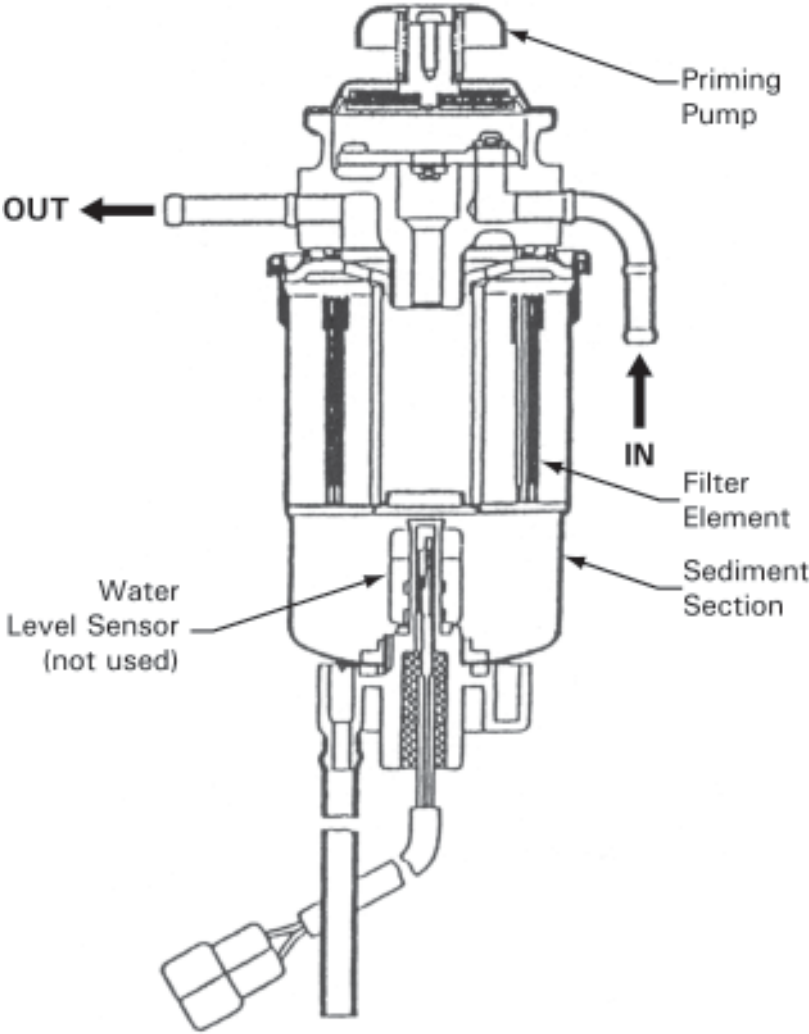


Fuel Pump Assembly

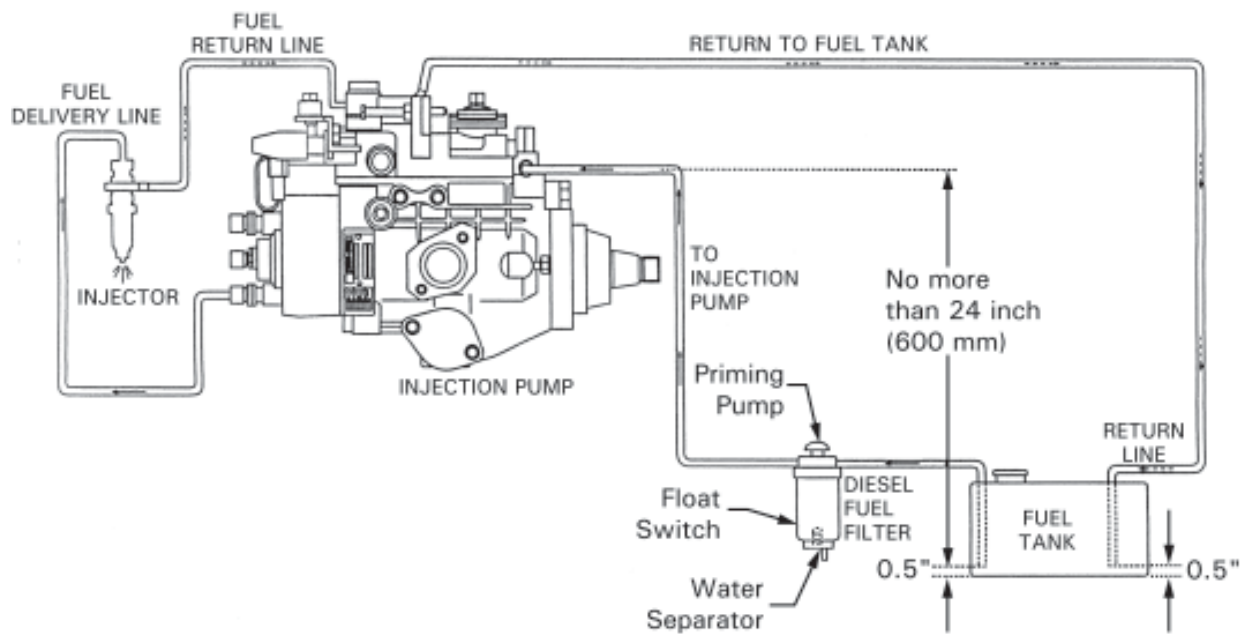
B4627 Rev—



Diesel Fuel Filter with Manual Priming Pump
and Water Separator with Electric Motor.



Diesel Fuel Flow Diagram



Introduction

Maxx 450D/470D/450 Diesel

Section 1-1

This manual contains installation and operation instructions as well as information required for proper maintenance, adjustment and repair of this unit. Since the first and most important part of repair work is the correct diagnosis of the problem, component manual troubleshooting charts have been included for your convenience.

Unlike a garden tractor, lawn mower or cement mixer, all having one or two functions to perform, the truckmounted carpet cleaning plant has many functions to perform simultaneously.

- The engine has to run at a consistent RPM.
- The vacuum has to pull air and dirty water back from cleaning site.
- The water pump provides stable pressure at proper water flow for cleaning.
- The chemical has to be injected into the water stream at the right concentration.
- The heating system must maintain proper heat.
- The vacuum tank must store dirty water until drained.

As you can see, it is not just a turn-key operation with one thing to worry about, **Does it start?!**

 **WARNING**

The manufacturer uses this symbol throughout the manual to warn of possible injury or death

 **CAUTION**

This symbol is used to warn of possible equipment damage.

Hours	Telephone Numbers
Monday - Friday	(425) 775-7276 Parts
8:00 am to 5:00 pm	(425) 775-7275 Service
PACIFIC STANDARD TIME	(800) 426-4225 Parts/Service Fax

Precautions

Although this unit has been factory adjusted, it may require additional adjustments to achieve optimum performance, for instance altitude may require carburetor adjustment and ambient temperatures may require heat control adjustment. When required, consult an authorized representative.

 **CAUTION**

THROUGH-FLOOR DRILLING: Be cautious when drilling holes through the van floor. Many vans have critical components mounted directly below the van floor that could be damaged by a misplaced drill bit. (See Product Support Bulletins 92102, 94062 and 94063 at the end of the manual.)

 **CAUTION**

ENGINE COOLING: Units employing internal combustion engines must not be enclosed within a van with doors and windows closed. Excessive temperatures within the engine will result in premature engine failure and a compromise of applicable warranty.

 **WARNING**

LEVEL OPERATION: During operation, van or trailer must be parked on level ground not to exceed + or - 10 degrees. Failure to insure proper leveling may prevent proper internal lubrication of engine, vacuum and/or high pressure components.

 **CAUTION**

MOVING PARTS: Never touch any part of the machine that is in motion. Severe bodily injury may result.

 **CAUTION**

ACID RINSE AGENTS: The increased demand for “clear water” rinsing results in the need for special care when using these acid based chemicals in your equipment. The negative side of these products is the corrosive effects the acid can have on metals, including swivels, pumps, heat exchangers, etc.

HydraMaster will not warranty parts that have been damaged from using unprotected acid products that have obviously caused failures.

 **CAUTION**

HARD WATER PROTECTION: Failure to take appropriate measures to prevent scale build up can result in **system failure** and **loss of warranty** on affected parts. Test the water in your immediate and surrounding areas with hard water test strips. Assume all water obtained from wells is hard. If you are operating in a “Hard Water Area” (3.5 grains or more per gallon), use a water softening system.

 **CAUTION**

FREEZE PROTECTION: There is often little warning before a cold spell. Therefore, not protecting this equipment from freezing will result in costly down-time. Placing an electric heater in the truck or parking the truck indoors will help to insure against freezing, but should not be the primary method of freeze protection.

 **CAUTION**

EXHAUST SYSTEM: Do not allow flammable material (i.e. oil, fuel, plastic or wood products) to come in contact with the exhaust system.

 **WARNING**

HOT SURFACES: During the operation of this equipment, many surfaces on the machine will become very hot. When near the van for any reason care must be taken not to touch any hot surface, such as heater, engine, exhaust, etc.

 **WARNING**

HEARING PROTECTION: The Occupational Safety and Health Administration (OSHA) recommends the use of hearing protection when a technician is exposed to an average of 85 decibels (this is an average of exposure over an 8 hour period). This equipment can produce 85 decibels to a distance of 10 feet. Please check with your local state agencies to see if OSHA standards apply to your application.

 **WARNING**

NO SMOKING: It is unsafe to smoke in or around the vehicle.

 **WARNING**

CARBON MONOXIDE: This unit generates toxic fumes. Position the vehicle so that the fumes will be directed **away** from the job site. **Do not park** where exhaust fumes can enter a building through open doors, windows, air conditioning units or kitchen fans.

 **WARNING**

TOXIC FUMES: Do not occupy the vehicle when the cleaning equipment is operating. Toxic fumes may accumulate inside a stationary vehicle.

 **WARNING**

ENGINE EXHAUST: The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

 **WARNING**

CARBURETOR DRAIN: Under no circumstances should the drain in the carburetor bowl be utilized when the machine is hot.

 **WARNING**

PORTABLE GAS TANK: **Never** operate this machine with a portable gas can inside the truck. Doing so increases the risk of a fire or explosion.

 **WARNING**

PORTABLE PROPANE TANK: Do not use a portable tank inside of the truck or van. It is dangerous and illegal in most states.

 **WARNING**

TRANSPORTATION OF FUEL CONTAINERS: Transportation in a vehicle of any vented fuel container that presently has or has ever contained a flammable liquid is strictly forbidden by HydraMaster Corporation and by federal and state regulation.

 **CAUTION**

The use of some chemicals through your mobile carpet cleaning plant can seriously damage the internal plumbing, high-pressure pump, chemical pump and heat exchangers. These harmful chemicals include concentrated acid (see the pH chart at the end of this section), solvents (including d-Limonene), and some paint, oil and grease removers with a high concentration of solvents.

System Operation

The MAXX heat exchanger system is a highly engineered cleaning plant designed by HydraMaster Corporation. The system utilizes a dynamic heating system comprised of three separate heat exchangers for capturing “free heat”.

The water flow is as follows:

Water is fed into the machine under tap pressure to the water box. The water is then picked up by the high pressure pump and pressurized to the desired level. The water then splits flow, as demanded by the technician. The majority of the water flows to the bypass valve assembly, then back through the blower exhaust heat exchanger, and back to the water box. The water demanded by the technician flows from the water pump, through the engine coolant heat exchangers, then through the engine exhaust heat exchanger and out to the cleaning tool.

When the cleaning solution reaches a preset high temperature, it activates the exhaust diverter valve control, which prevents the exhaust gases from entering the exhaust heat exchanger. Once the solution temperature falls below the set point, the exhaust diverter valve activates to allow the exhaust gases to flow back through the exhaust heat exchanger. If the exhaust diverter valve becomes inoperable for any reason, the high pressure solenoid valve is activated to release the heated water from the system and is directed to the recovery tank. Then cool water enters the system to regulate the temperature.

As there is no guess work in the manufacture of these highly advanced cleaning plants, there must be none in preparing it to get the job done in the field. It is the purpose of this manual to help you properly understand, maintain and service your cleaning plant. Follow the directions carefully and you will be rewarded with years of profitable, trouble-free operation.

It is imperative that no section be overlooked when preparing for operation of this equipment.

Machine Specifications

Frame: 24.5"W x 47.75"L x 37.375"H

Weight: 600 lbs.

Cowling: Aluminum with Epoxy finish

Engine: Daihatsu Liquid Cooled 3 Cylinder, Cast Iron Block, Diesel as required.
Displacement: (450D) 697cc, (470D) 950cc, (Diesel) 850cc
Ignition: Electronically Triggered Coils (1 per cyl.)
12 v Electric Starter Motor
12 v, 40 amp Alternator, Regulated
Electronic Governor
Pressurized Oil System with Filter
Pressurized Cooling System
Triple Row Radiator

Vacuum Blower: Proprietary Dual Shaft Roots
(450D, Diesel) 45 RAI J WhispAir™, (470D) 47 RAI J WhispAir™

Chemical System: High Pressure Injected, Meter Controlled

Heating System: 1 Stainless Steel Coil Exhaust Heat Exchanger
2 Water-to-Water Copper Shell and Tube Heat

Exchangers: 1 Air-to-Water Copper Shell and Tube Heat Exchangers

Instruments and Controls: Water Pressure Gauge, Liquid Filled, 0-1500 PSI
Water Temperature Gauge, 0-250°F
Vacuum Level Gauge, 0-30" Hg
Hour Meter, Machine Run Time
Chemical Flowmeter, Clear Acrylic, 0-10 GPH
Chemical Metering Valve
Chemical Selector Valve
Heat Bypass Lamp
Overheat Protection Lamp
Overheat Shutdown Lamp
Overheat Engine Lamp

Instruments and Controls (cont.):

Engine Charging Lamp
Engine Oil Pressure Lamp
Engine Diagnostic Lamp
Pump Out Operating Lamp
"Vacuum Tank Full" Lamp
"Water Supply Low" Lamp
Keyed Ignition
Circuit Breakers Panel
Accessory Switches
Electronic Three Speed Engine Throttle
Mix Tank Drain Valve
Recovery Tank Drain Valve
Panel Mounted Pressure Adjustment Valve
Electric Engine Choke
Diverter Valve Control Switch
Blower Lubrication Port

Recovery Tank: 100 gallon Aluminum, Epoxy Finish

Cleaning Wand: Stainless Steel
—Grip and Replaceable Vacuum Lips with
Stainless Steel Solution Valve.

High Pressure Hose: ¼" High Temperature, Lined, Vinyl Covered
Hose rated to 2200 PSI, 250° F.

Vacuum Hose: 2" Reinforced, 1 ½" Reinforced

Standard Equipment: Machine Power Console
Full Instrumentation
WhispAir™ Vacuum Blower
MAXX™ Water Heating Package
Vacuum Recovery Tank
Carpet Cleaning Wand
5 gallon Chemical Jug
Chemical Jug Holder
Chemical Jug Fill Line
150 ft, 2" Vacuum Hose
10 ft, 1 ½" Wand Whip-line
10 ft, 1 ½" Recovery Drain Line

Standard Equipment: 50 ft, Water Supply Line
150 ft, ¼" Solution Line
Dual-Wand Vacuum Fittings
Dual-Wand Solution Fittings
Battery Box with Holder
Van Decal Package
Van Installation Kit
Operation Manual
HydraMaster Jacket

Optional Equipment: Please refer to Section 14.

Spare Parts

Down-time on the unit can be very expensive, because your truckmounted unit is capable of generating several hundred dollars per day. In order to minimize such down-time, it is strongly recommended by the manufacturer that you purchase and keep in your truck the parts listed below.

Parts Orders

To expedite your parts needs, please call your sales representative. In most instances, he either stocks or has access to parts through a regional service center. If further assistance is needed, contact the factory and coordinate your needs. If this becomes necessary, always indicate the method of shipment you desire, i.e. UPS, Blue Label, Air Freight, Air Express, etc.

HydraMaster Parts Dept. Phone (425) 775-7276
HydraMaster Parts Dept. Toll Free Fax 1-800-426-4225

Spare Parts List (078-330)

PART NO	DESCRIPTION	QTY
010-056	Belt, 4L230 Air Pump Drive (450D Only)	1
010-057	Belt, A28 APO Drive	1
010-059	Belt, A24 Air Pump Drive (470D Only)	1
010-061	Belt, A44 Pump Drive	1
010-080	Belt, BX40 Eng. Drive	2
010-110	Belt, XL7390, Air Pump Gate (450D only)	1
010-115	Belt, XL7395, Air Pump Gate (470D only)	1
056-007	Fuse, 10 amp Circuit	2
056-008	Fuse, 15 amp Circuit	1
046-010	Diaphragm	1
049-002	Fuel Filter	1
049-013	Filter, 3" Stainless Steel Vacuum Pump	1
049-014	Filter, Oil - Daihatsu	1
049-016	Filter, ¼" 'Y'	1
049-118	Filter, ¼" Chemical Filter	1

Spare Parts List (078-330 cont.)

PART NO	DESCRIPTION	QTY
049-023	Screen, Garden Hose	1
049-063	Filter, Air - Daiatsu	1
049-068	Fuel Separator (<i>450 Diesel Only</i>)	1
052-050	Quick Connect, 440 Male	3
052-051	Quick Connect, 440 Female	2
052-052	Quick Connect, 660 Male	1
052-053	Quick Connect, 660 Female	1
056-010	Fuse, 25 amp.	1
074-032	Meter, Chemical Flow	1
078-019	Kit, H/M Solution Valve	1
078-273	Kit, Bypass Valve Repair	1
157-040	Switch, 12V DC Lighted, ON/OFF	1
157-080	Switch, s/s Float	1
157-131	Switch, 12V DC, Lighted ON/OFF/ON	1
157-008	Switch, Ignition	1
157-022	Switch, Relay	2
169-022	Valve, 1 ½" Full Port	1
169-155	Valves, Check	2
169-160	2-way Valve	1
169-017	3-way Valve	1
180-004	Orifice, Primary	1
180-006	Orifice, Secondary	1

NOTE:

Engine Oil: **30 weight** motor oil with a minimum standard of SE, SF, SG.

Blower Oil: 40 weight **non detergent**

Pump Oil: 40 weight **non-detergent**

Responsibilities

 **CAUTION**

Purchase heavy duty 42 - 60 amp hour battery and have the battery 'slow' charge if new. If the battery is not fully charged, damage can occur to the engine charging regulator.

Reading of Owner's Manual: It is the purchaser's responsibility to read the unit operation manual and to familiarize himself with the information contained therein. *Special attention should be paid to all **Cautions and Warnings**.*

The **Sales Representative's** responsibilities are:

ACCEPTANCE OF SHIPMENT:

1. If the unit shows any outward signs of damage, do not sign the delivery receipt until you have closely inspected the unit and noted any damage on the delivery receipt.
2. The salesman from whom you purchased your unit is responsible for supervising the correct installation of the unit in your vehicle and thoroughly training you in its operation, maintenance and precautions.

Correct Installation Includes:

- Installation of through-floor fittings for gasoline fuel lines
- Placing the unit and recovery tank in your vehicle and securing them with bolts or tie down cleats
- Install and connect the fuel pump.
- Connecting gasoline lines

Correct Installation (cont.)

- Connecting the battery
- Checking the pump, vacuum blower and engine oil levels prior to starting the unit
- Starting the unit to check engine and see that all systems function normally
- Checking all hoses, wands, etc. for correct operation.

NOTE: Under certain circumstances, machines may require modification for optimal performance. Certain environmental conditions may require engine modification or control function calibration.

Training Shall Include:

- A thorough review of the operation manual with purchaser;
- Instruction and familiarization in:
 1. How to correctly start up and shut down the unit
 2. How to correctly clean with the unit
 3. Where and how often to check and change component oil levels
 4. How the unit's systems work
 5. How to troubleshoot the unit
 6. How to do basic repairs
 7. Safety precautions and their importance
 8. Freezing damage and how to avoid it
 9. Hard water damage and how to avoid it
 10. Cleaning the orifices and how they function in the system
- A thorough review of the unit warranty and warranty procedures.
- A thorough review of hard water precautions and warnings.
- How to determine hard water areas.
- Use of water softening systems.

Vehicle Preparation

When selecting a truck, remember the preferable vehicle for a Boxxer 421 installation is a cargo van with a heavy-duty suspension package and a half ton capacity. If a fresh water tank is added, a three quarter ton or larger capacity van, with a 2,400 pound payload capacity, is required.

TRUCK PREPARATION

The manufacturer recommends the installation of a spray-on bed liner in the vehicle prior to installation of machine.

CAUTION

Be cautious when drilling any holes through the van floor. Many vans have critical components mounted directly below the van floor that could be damaged by a misplaced drill bit. (See Product Support Bulletins 92101, 94062, and 94063 at the end of this manual.)

This provides 'metal to cushion' mounting rather than 'metal to metal' and makes for an attractive van interior. It is highly recommended to install roof vents in vehicles operated in hot weather locations. Roof vent positions are shown in Figure 1-1.

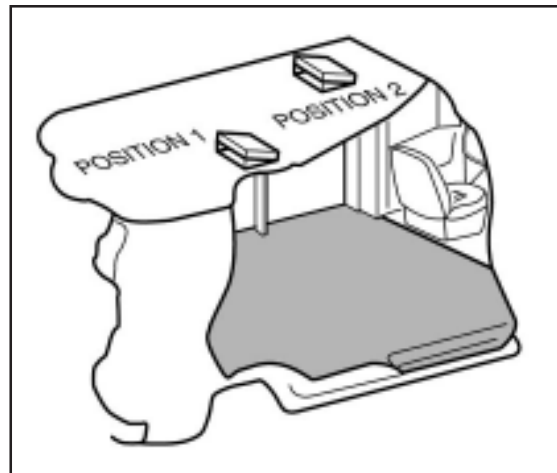


Figure 1-1 Roof Vent

PLACEMENT OF UNIT IN VEHICLE

There are two recommended unit placements:

SIDE DOOR:

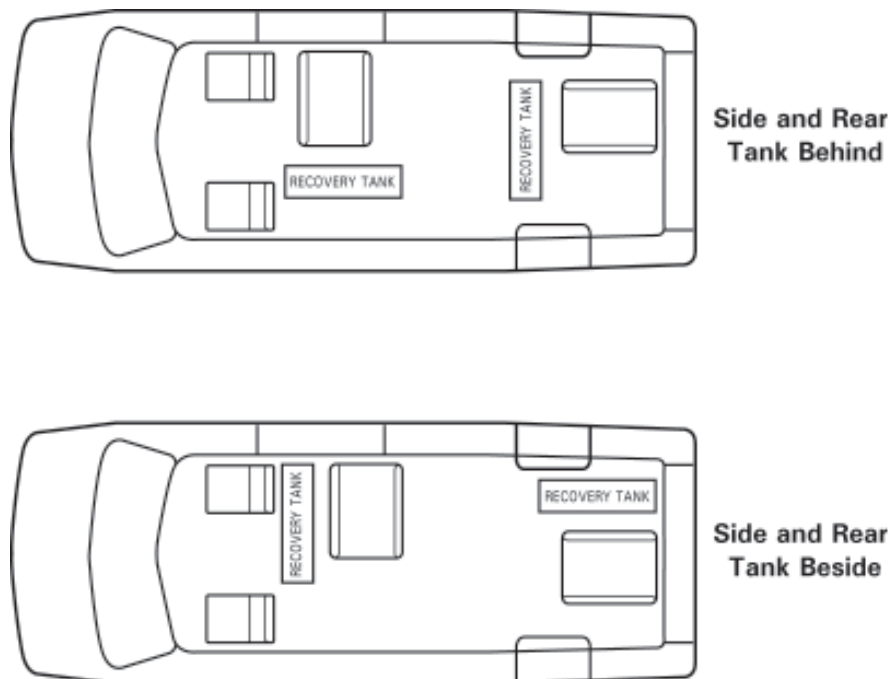
Most installations are side door. This provides rear access for accessories and hoses as well as unobstructed access to the component/working side of the machine, thus making it a bit easier to perform maintenance and/or repair without removing the unit from the truck.

REAR DOOR:

Although this location partly limits working access, it does direct the noise away from the cleaning site. Some cleaners in the colder areas prefer this location because it puts the weight over the rear wheels for better traction in ice and snow. Rear mounting requires the unit to be slid to the right side as far as possible.

This not only provides adequate working space on the component side of the unit but also improves weight distribution inside the van (engine and component weight line up over drive shaft). Also, it is physically easier to load the unit into the rear door due to the height of the van bed.

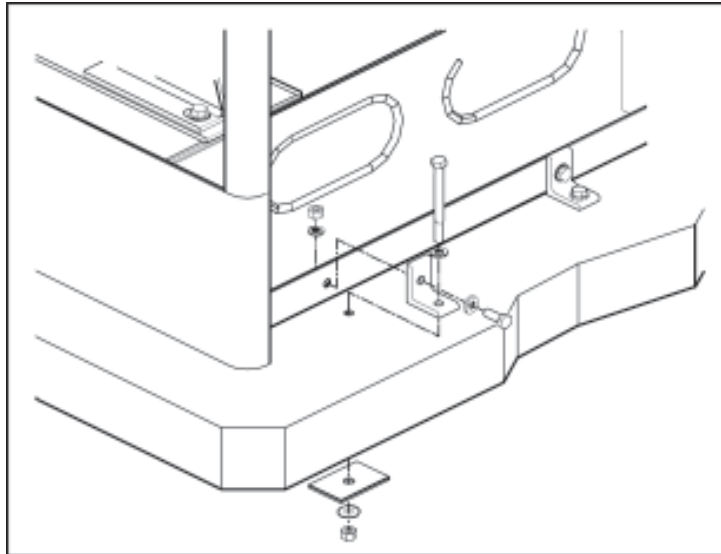
Figure 1-2 Recommended Placement



Machine Tie Down Cleats

Secure the machine to the floor of the van with the four tie down cleats provided. This safety measure will ensure that the machine will not slide inside the van. See the following illustration for the correct installation.

Figure 1-3 Installation Using Tie-down Cleats



Ensure that the machine is well secured to the floor of the van with the hardware supplied. A sudden or crash stop will cause the machine to rocket forward. Protect yourself and the machine. **SECURE IT!**

WARNING

It is recommended by the manufacturer that the exhaust from the front of the machine be vented down under the truck to prevent carbon monoxide from entering the job site. **Always park the truck so the exhaust is blowing away from the job site.**

The manufacturer also recommends the installation of aluminum vents in the truck roof to allow heat to escape.

WARNING

Never operate this machine with a portable gas can inside the truck. Doing so increases the risk of a fire or explosion.

Mount a fire extinguisher just inside the rear or side door for emergencies.

 **WARNING**

Do not use a portable propane tank inside of the truck or van. It is dangerous and illegal in most states.

 **WARNING**

Transportation in a vehicle of any vented fuel container that presently holds or has ever held a flammable liquid is strictly forbidden by HydraMaster Corporation and by federal and state regulation.

 **WARNING**

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

High Altitude Operation Preparation

To have your machine run at it's peak performance; you may have to make adjustments depending on the elevation. Elevation plays a key role in how the machine will operate.

The factory setting of the machine is set for elevations from 0—3,000 feet. Any time the machine is operated above 3,000 feet there are two areas on the machine the *may* need adjustment.

The first area is the carburetor jet. The higher the elevation, the less air is provided to the fuel mixture. This will make the engine run 'rich', and, in turn will result in the loss of power, excessive heat in the exhaust, and carbon build-up in the exhaust and heat exchanger system. The jet sizes vary per engine and elevation. Consult HydraMaster to obtain proper jet size.

Carburetor Jet- See chart below for specific jet size.

Maxx 450D/700G Daihatsu Engine				Maxx 470D/950G Daihatsu Engine			
Altitude	P/N	BS&D P/N	Jet Size	Altitude	P/N	BS&D P/N	Jet Size
0-3,000 ft. (Factory Jet)	076-063	825469	#130	0-3,000 ft. (Factory Jet)	076-064	820627	#140
2,400-6,600 ft.	076-060	820457	#120	2,400-6,600 ft.	076-065	825470	#132
6,000-10,000 ft.	076-062	825471	#112	6,000-10,000 ft	076-061	825291	#126

The second area that may need adjustment is the heat control system. The heat control system is also optimized to 0-3,000 feet. At higher altitudes the boiling point of water is lowered. In turn, this can cause the water box to boil and the high pressure pump to cavitate. The heat control system settings will have to be adjusted to compensate for the elevation. These settings will vary according to elevation. Contact HydraMaster to obtain the recommended settings.

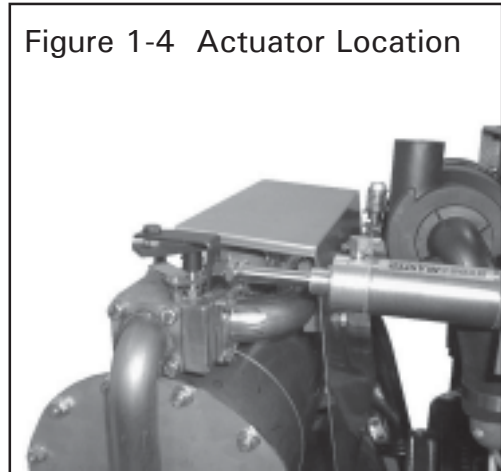
Thermal Relief Valve - Change from 180°F to 165° F. Order Part No. 000-169-027 - 165° F Thermal Relief Valve.

Diverter Valve - Machines that are equipped with a diverter valve may need adjustment after the machine has been installed.

Prior to running the machine, perform the following steps:

- 1) Locate the actuator connected to the diverter valve arm which is at the top left of the machine U-bracket, near the rear of the machine. See Figure 1-4.
- 2) The actuator shaft is connected to the diverter valve arm. Pull the actuator shaft forward and listen to hear if the poppet seals against the seat in the diverter valve. Push the actuator shaft back and listen to see if the poppet seals against the seat in the diverter valve.

Figure 1-4 Actuator Location



If the poppet **seats** in both directions, the the diverter actuator is in proper adjustment.

If the poppet **does not** seat in one or both directions the valve is out of adjustment. Perform the following steps to adjust the diverter actuator shaft.

- 3) The end of the actuator shaft is threaded into the diverter arm and is secured into position with a back-up nut. This nut must be loosened to allow adjustment.
- 4) Loosen the actuator back-up nut. This will allow you to rotate the actuator shaft clockwise or counter-clockwise. Rotate the actuator shaft one half turn at a time. Then pull the actuator shaft forward and back. Listen to hear if the poppet seals in the seat of the diverter valve. Repeat this step until the diverter poppet seals in both directions. See Figure 1.
- 5) Apply red Loctite on the thread of the actuator shaft. Re-tighten the back-up nut.
- 6) Recheck the adjustment. Move the actuator shaft forward and back. Listen to hear if the diverter poppet seals in both directions. The diverter is now properly adjusted.

Local Water Precautions

The quality of water varies greatly. Many areas have an excess of minerals in the water which results in what is commonly called "hard water." These minerals tend to adhere to the insides of heater coils and other parts of the machines causing damage and a loss of cleaning effectiveness. This influences the reliability and efficiency of equipment in direct proportion to the level of hardness.

HARD WATER ADVISORY

HydraMaster recognizes that any hard water deposits which might occur within the water system of our truckmounts is a serious problem. The precision technology of truckmount heat exchanger systems is intolerant of any foreign material. Hard water deposits will ultimately decrease the performance of the system and are expected to seriously lower the reliability of the machine.

To validate a machine's warranty, HydraMaster requires that all machines operating in designated "Hard Water Areas" (3.5 grains or more per gallon) be fitted with a water softening system or a properly installed magnetic-type de-scaler must be used and maintained. Periodic de-scaling or acid-rinsing alone is not adequate in these areas. HydraMaster does not recommend any particular type or brand, however the relative effectiveness of some types of magnetic de-scalers or softeners may require additional periodic use of de-scaling agents.

HydraMaster also recommends, in the strongest possible terms, that machines in *all areas* be fitted with a water softening system for improved operation and reliability.

HydraMaster has included five hard water test strips with your machine. These can be used to test the water in your immediate and surrounding areas as they can vary greatly. Assume all water obtained from wells is hard.



Failure to take appropriate measures to prevent scale build up can result in **system failure** and **loss of warranty** on affected parts.

HARD WATER AREA MAP

The following map defines areas in the United States which compromise fluid related components such as hoses, fittings, heaters, pumps, valves and water cooled engines. For other countries, hard water area maps can be obtained from geological societies.

WATER SOFTENER

Cleaning efficiency and equipment life is increased, chemical use decreased, and the appearance of cleaned carpets enhanced when water softeners are incorporated in hard water areas. The manufacturer strongly urges the use of water softener units in areas exceeding 3½ grains per gallon. Failure to use a water softener in these areas will invalidate the machine's warranty. Using a Hard Water Area map as a reference, determine the quality of water in your area and take action immediately, if necessary.

Reports from several of our machine users commending the results of the use of water softeners in conjunction with their machines prompts us to recommend the procedure to everyone in a "hard water" area.

The relatively low cost of a water softener service is more than made up for by an increased life of machine parts, reduced chemical costs and continued cleaning efficiency. The water softener will also increase the *effectiveness* of the cleaning chemicals, therefore less chemical will be needed.

Contact a water softener distributor in your area for information on the rental of a simple water treatment unit to carry in your truck. Be sure to change the water softener in accordance with the capability of the softener. For example: If the softener will treat 900 gallons of water and the machine uses an average of 30 gallons per hour, for an average of 5 hours a day, this equals 150 gallons per day. In 6 days the machine would use 900 gallons of water. Therefore, the softener would need to be changed every 6 working days for maximum softening.

WASTE WATER DISPOSAL ADVISORY

There are laws in most communities prohibiting the dumping of recovered "gray" water from carpet cleaning in any place but a sanitary treatment system.

Waste Water Disposal Advisor (cont.)

This cleaning rinse water, recovered into your unit's vacuum tank, contains materials such as detergents. These must be processed before being safe for streams, rivers and reservoirs.

IN ACCORDANCE WITH THE EPA, STATE AND LOCAL LAWS, DO NOT DISPOSE OF WASTE WATER INTO GUTTERS, STORM DRAINS, STREAMS, RESERVOIRS, ETC.

In most cases, an acceptable method of waste water disposal is to discharge into a municipal sewage treatment system after first filtering out solid material such as carpet fiber. Access to the sanitary system can be obtained through a toilet, laundry drain, RV dump, etc. Permission should first be obtained from any concerned party or agency.

One disposal method which usually complies with the law is to accumulate the waste water and haul it to an appropriate dump site. Another solution to the disposal problem is to equip yourself with an Automatic Pump-Out System (APO). These systems are designed to remove waste water from the extractor's recovery system and actively pump the water through hoses to a suitable disposal drain. Properly designed, they will continuously monitor the level of waste water and pump it out simultaneously to the cleaning operation. The hidden benefit of this process is that the technician does not have to stop his cleaning to empty the recovery tank. HydraMaster makes an APO system available which can be ordered with new equipment or installed later.

The penalties for noncompliance can be serious. Always check local laws and regulations to be sure you are in compliance.

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*Machine Assemblies
and Parts Lists*

This section will be revised as drawings become available

Figure 1-7 Maxx 450D/470D Frame Assembly - View 1

D-4355 Rev F

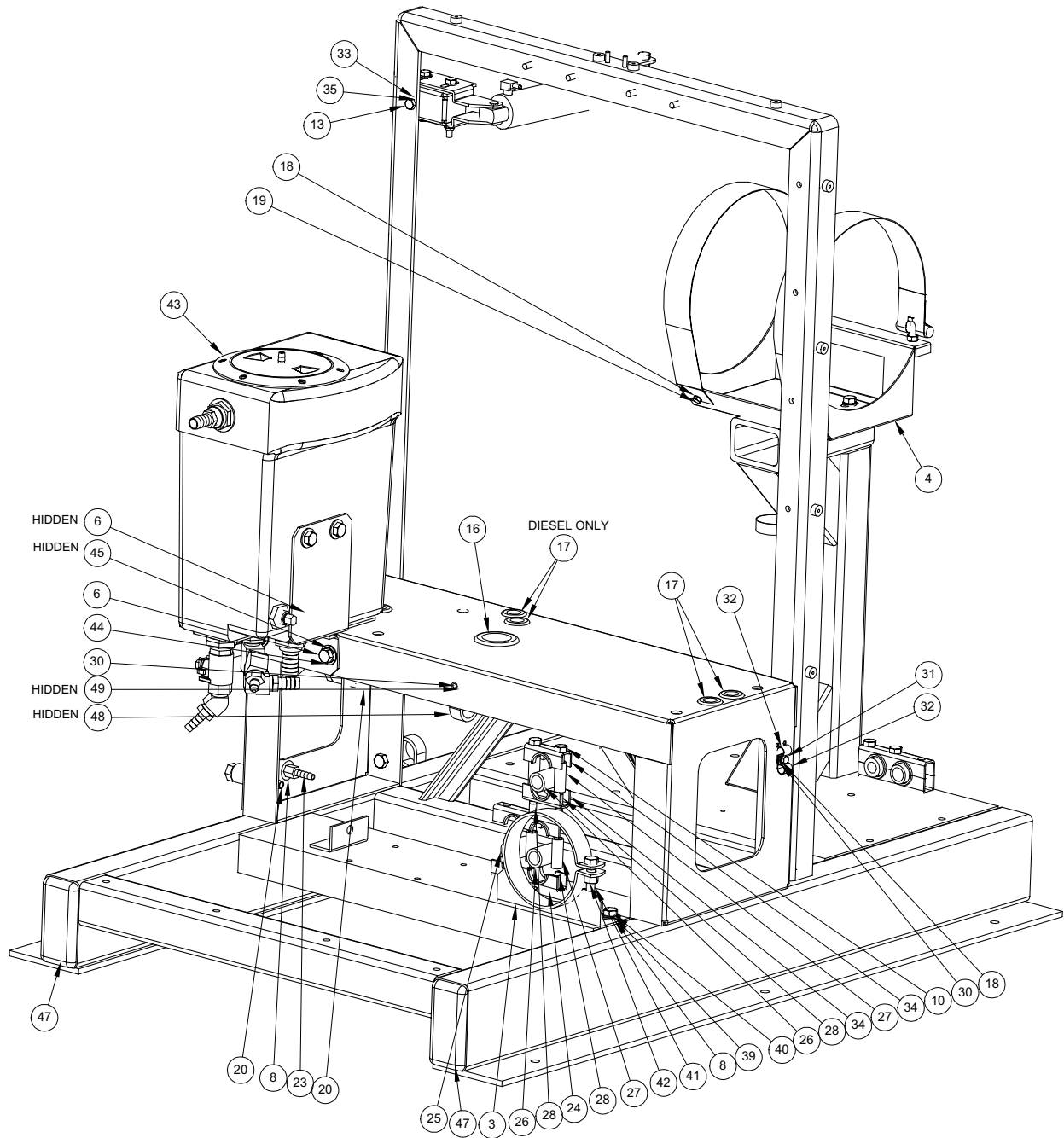
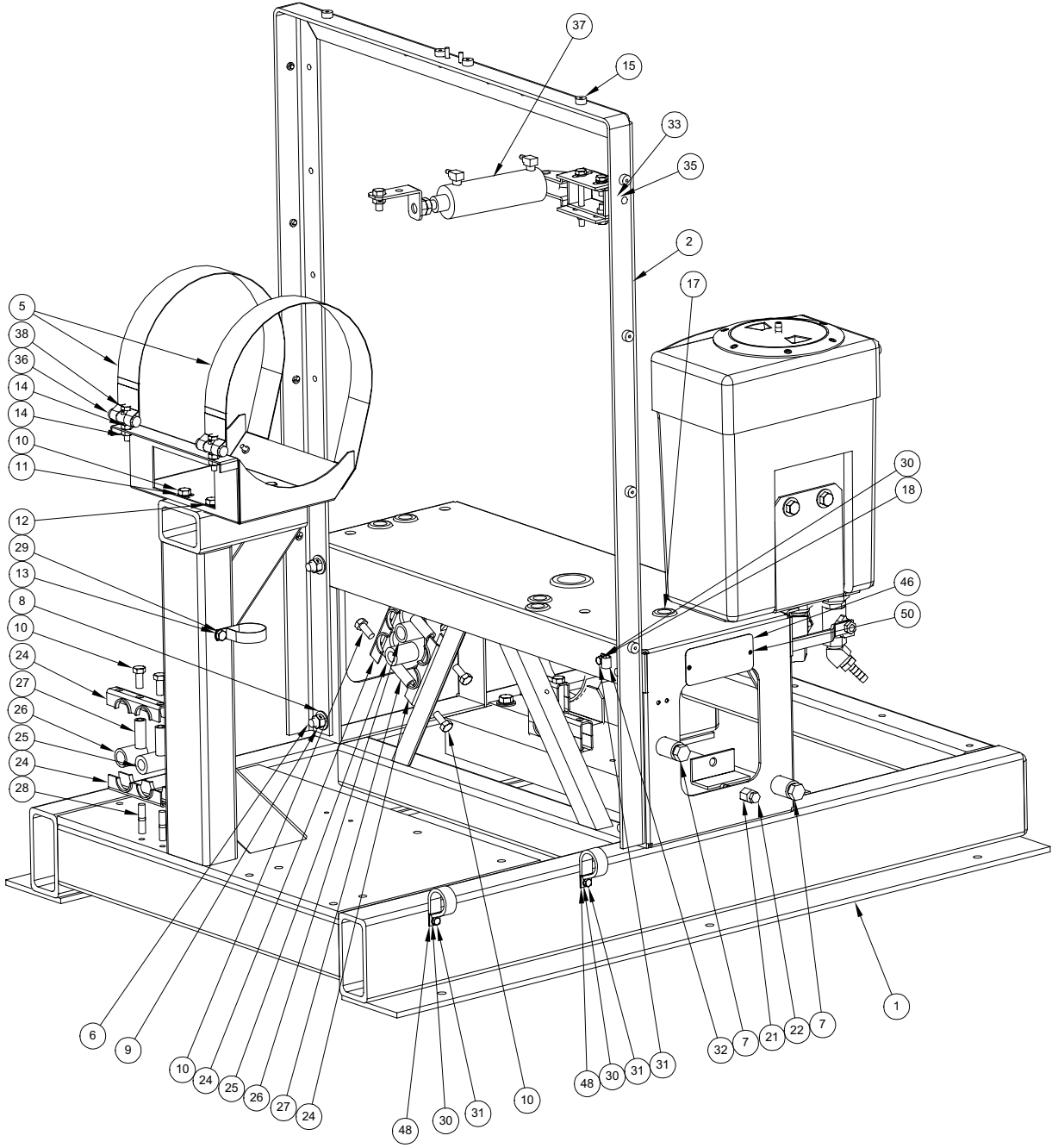


Figure 1-8 Maxx 450D/470D Frame Assembly - View 2
D-4355 Rev F



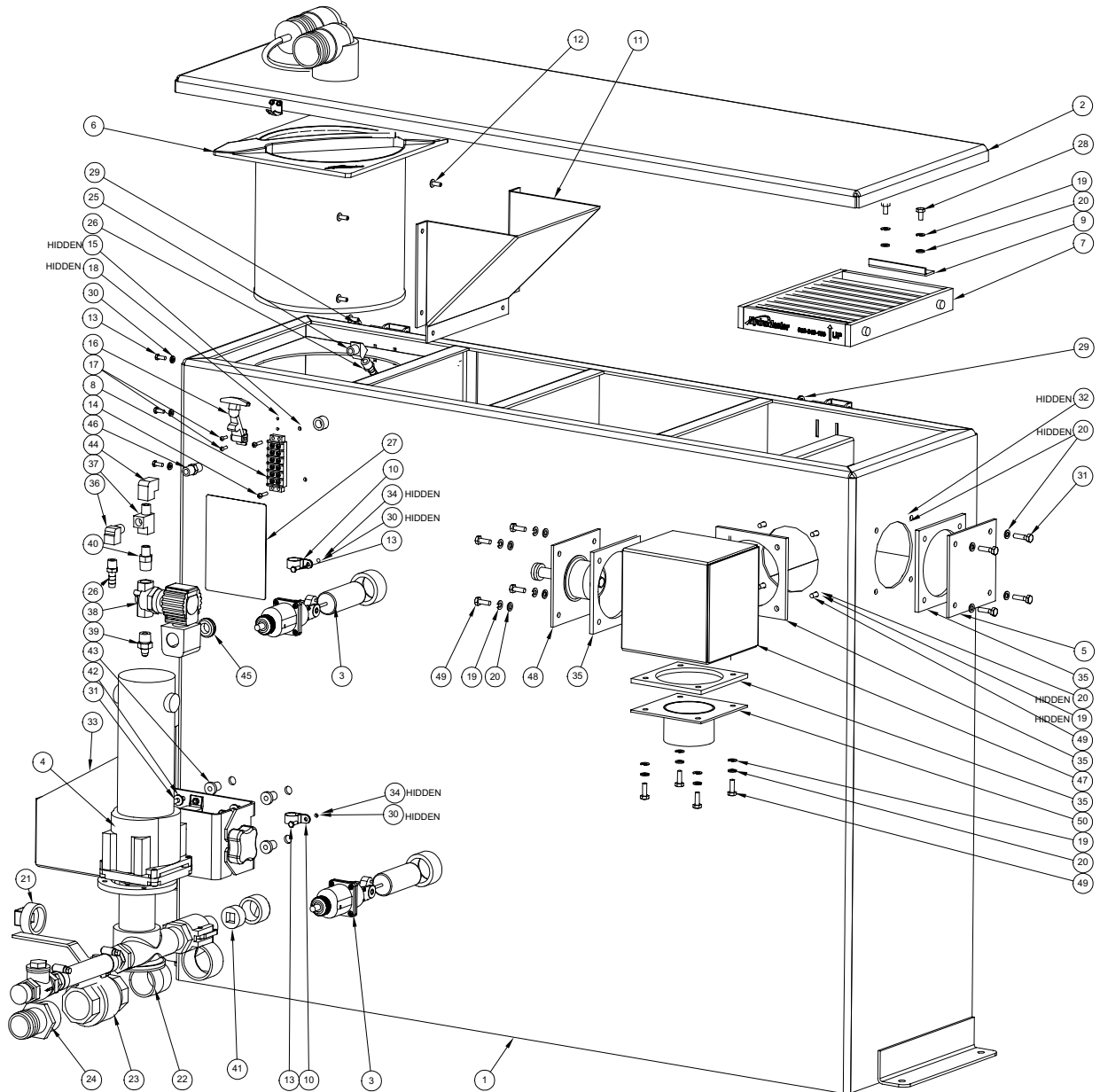
Frame Assembly Parts List

Item	Part Number	Description	Qty
1	000-055-155	Frame, Final Stock - Maxx 450D/470D	1
2	000-055-138	Frame, Engine Cover - Maxx 450D/470D	1
3	000-015-600	Bracket, Heat Exchanger Mount	1
4	000-015-629	Bracket, After Burner Mounting Saddle	1
5	000-033-115	Clamp, After Burner Mount	2
6	000-143-096	Screw, 3/8"-16UNC x 1.00" Lg. Hex Head	8
7	000-106-003	Plug, 3/8" NPT Hex	2
8	000-174-032	Washer, 3/8" Flat	7
9	000-094-015	Nut, 3/8"-16UNC Hex 2-Way Locking	4
10	000-143-012	Screw, 5/16"-18UNC x 0.75" Lg. Hex Head	12
11	000-174-018	Washer, 5/16" Lock	4
12	000-174-049	Washer, 5/16" Flat	4
13	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	2
14	000-094-010	Nut, 1/4"-20UNC Hex	4
15	000-108-115	Protector, 5/8" Bumper	12
16	000-060-010	Grommet, 1-5/16" I.D.	1
17	000-060-002	Grommet, Large Wiring	5
18	000-174-014	Washer, #10 Lock	4
19	000-143-327	Screw, #10-32UNF x 0.50" Lg. Hex Head	2
20	000-052-104	Insert, #66 (3/8" NPT x 3/8" Barb)	2
21	000-052-427	Bushing, 1/8" NPT x 1/8" FPT	1
22	000-106-001	Plug, 1/8" NPT	1
23	000-052-109	Insert, #F24 (1/8" NPT x 1/4" Barb)	1
24	000-033-119	Clamping Unit, HC-10-2-3, 2 Position	6
25	000-020-041	Bushing, Split, G-10-8 Clamping Unit	3
26	000-020-042	Bushing, Split, G-10-8 Clamping Unit	4
27	000-094-104	Nut, Stacking, N-10 Clamping Unit	8
28	000-143-199	Screw, Thread Adapter T-10, Clamping Unit	6
29	000-033-053	Clamp, 1-1/2" Cushion Loop	1
30	000-174-001	Washer, #10 Flat	5

Frame Assembly Parts List

Item	Part Number	Description	Qty
31	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	4
32	000-033-044	Clamp, 3/8" Tube	3
33	000-094-009	Nut, 1/4"-20UNC Hex Nylock	2
34	000-033-120	Clamping Unit, HC-10-1 Single Position Unit	2
35	000-174-003	Washer, 1/4" Flat	2
36	000-141-033	Rod, Heat Exchanger Strap - Retainer	2
37	Fig. 1-24	Assembly, Diverter Valve Actuator - Maxx 450D/470D	1
38	000-143-004	Screw, 1/4"-20UNC x 1.50" Lg. Hex Head	2
39	000-174-021	Washer, 3/8" Lock	2
40	000-143-017	Screw, 3/8"-16UNC x 0.75" Lg. Hex Head Grd. 8	2
41	000-143-025	Screw, 3/8"-16UNC x 1.25" Lg. Hex Head Grd 8	1
42	000-094-100	Nut, 3/8"-16UNC Hex Nylock	1
43	Fig. 1-18	Assembly, Water Box - Poly - Maxx	1
44	000-174-004	Washer, 5/16" Flat	4
45	000-174-057	Washer, 3/8" Lock	4
46	000-105-012	Plate, Machine Serial I.D.	1
47	000-027-034	Cap, Frame End - Modified - Maxx/CTS 450	2
48	000-033-057	Clamp, 1" Cushion Loop	3
49	000-094-034	Nut, #10-24UNC Nylock	1
50	000-140-001	Rivet, 1/8" x 1/4" Aluminum	2

Figure 1-9 100 Gallon Universal Recovery Tank Assembly
D-6984 Rev -



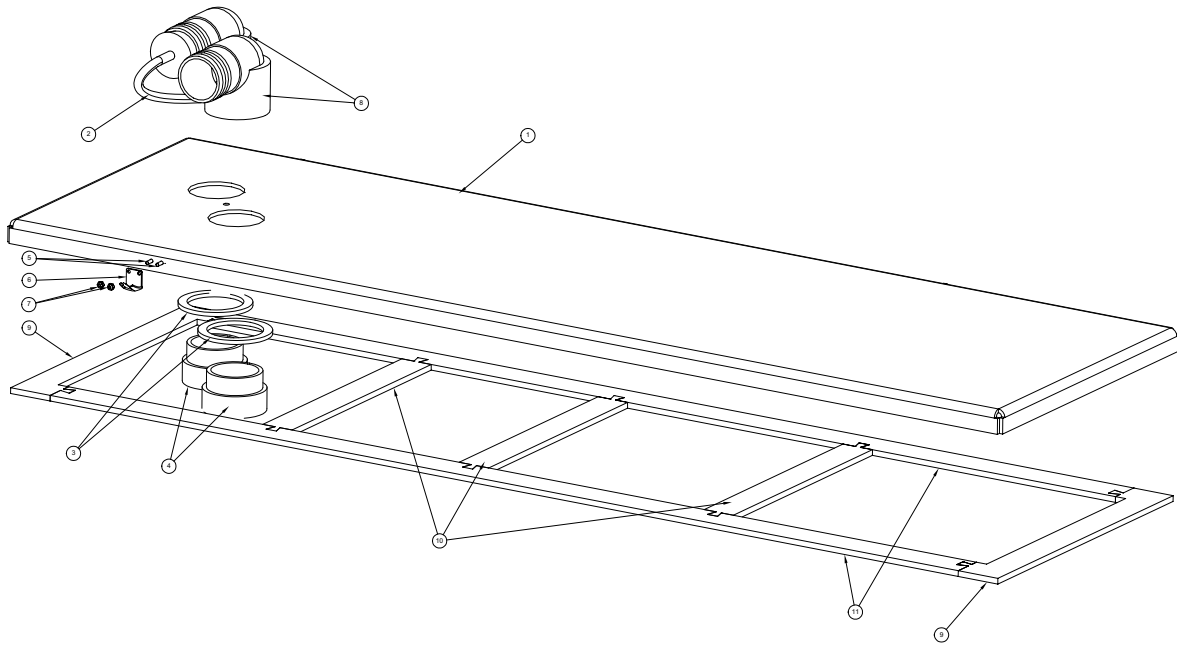
100 Gallon Universal Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty
1	000-159-129	Tank, 100 Gallon Universal Recovery - Weldment	1
2	Fig. 1-10	Assembly, Recovery Tank Cover - 100 Gallon	1
3	000-157-090	Float, Lever Switch	2
4	000-079-091	Kit, Dura-Flow APO - Production (Fig. 1-22)	1
5	000-105-336	Plate, Vacuum Port Cover - 100 Gallon Universal Recovery T	1
6	000-049-152	Filter, Recovery Tank Basket	1
7	000-049-153	Filter, Flat - Recovery Tank	1
8	000-012-002	Block, 6 Post Terminal	1
9	000-015-932	Bracket, Flat Filter Securing - Universal Recovery Tank	1
10	000-033-023	Clamp, 3/4" Nylon Hose	2
11	000-049-154	Deflector, Air - Univeral Recovery Tank	1
12	000-140-023	Rivet, AB8-6A Aluminum Pop	6
13	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	5
14	000-143-051	Screw, #8-32UNC x 0.75" Lg. Binder Head Phillips	2
15	000-094-059	Nut, #8-32UNF Nylock	2
16	000-086-008	Latch, Bungie	1
17	000-143-539	Screw, #6-32UNC x 0.50" Lg. Button Head Allen	2
18	000-094-063	Nut, #6-32UNC Nylock	2
19	000-174-019	Washer, 1/4" Lock	14
20	000-174-003	Washer, 1/4" Flat	22
21	000-106-019	Plug, 1-1/2" NPT	1
22	000-052-763	Nipple, 1-1/2" Ips Close s/s	1
23	000-169-022	Valve, 1-1/2" Full Port Ball	1
24	000-052-226	Insert, 1-1/2" NPT x 1-1/2" Barb (Grey)	1
25	000-052-082	Elbow, 1/4" NPT Street x 45°	1
26	000-052-102	Insert, #46 (1/4" NPT x 3/8" Barb)	2
27	000-081-115	Label, Maintenance & Lubrication Schedule	1
28	000-143-333	Screw, 1/4"-20UNC x 0.50" Lg. Hex Head	2
29	000-174-029	Washer, 3/8" Rubber Back	2
30	000-174-036	Washer, #10 Flat Rubber Backed	5

100 Gallon Universal Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty
31	000-143-002	Screw, 1/4"-20UNC x 1.00" Lg. Hex Head	8
32	000-094-009	Nut, 1/4"-20UNC Hex Nylock	4
33	000-166-002	Tray, Soap Jug - Weldment	1
34	000-094-034	Nut, #10-24UNC Nylock	2
35	000-057-206	Gasket, Adapter - Universal Recovery Tank	4
36	000-052-085	Elbow, 1/4" NPT Street	1
37	000-052-090	Tee, 1/4" NPT Branch M-F-F	1
38	000-169-082	Valve, 12 Volt Solenoid 1200 PSI	1
39	000-052-662	Nipple, 3/8" NPT x 1/4" M SAE	1
40	000-052-073	Nipple, 3/8" NPT x 1/4" NPT Hex	1
41	000-106-049	Plug, 1" NPT Allen Head	1
42	000-174-060	Washer, 1/4" Flat Rubber Backed	4
43	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	4
44	000-052-088	Elbow, 1/4" FPT x FPT	1
45	000-060-002	Grommet, Large Wiring	1
46	000-052-071	Nipple, 1/4" NPT Hex	1
47	000-013-070	Box, Vacuum Relief Valve - Universal Recovery Tank	1
48	Fig. 1-11	Assembly, Vacuum Relief Valve	1
49	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	12
50	000-001-132	Adapter, Tank To Ø3.0" Blower Hose - Universal Recovery T	1

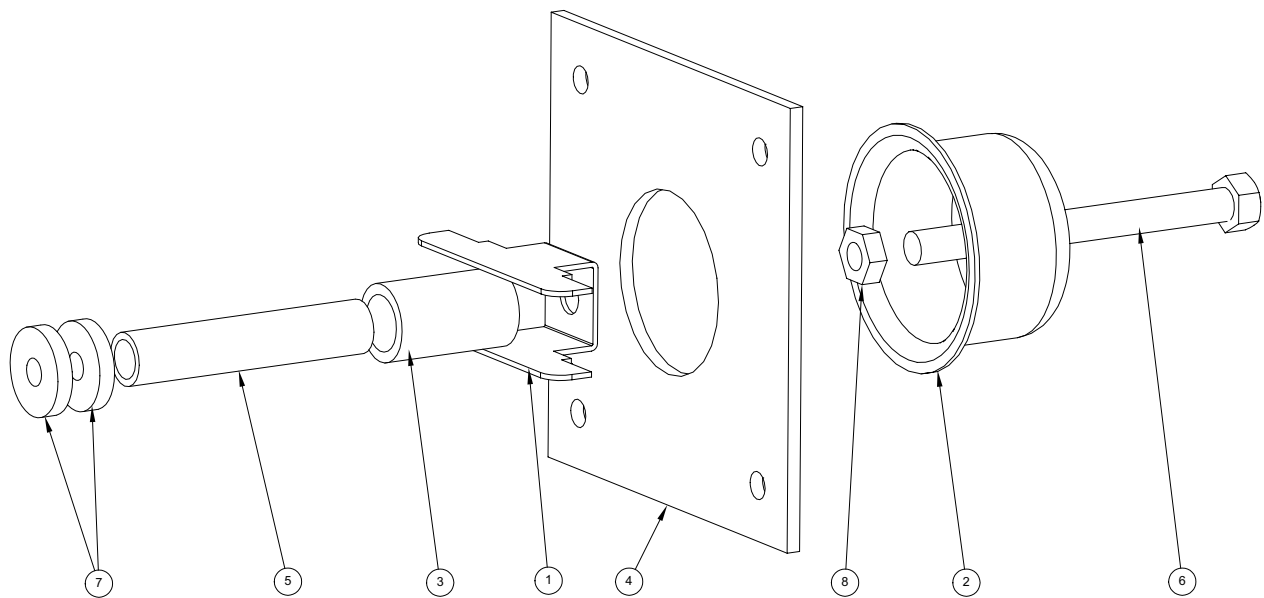
Figure 1-10 100 Gallon Universal Recovery Tank Cover Assembly
D-6919 Rev -



100 Gallon Universal Recovery Tank Cover Assembly Parts List

Item	Part Number	Description	Qty
1	000-041-447	Cover, 100 Gallon Universal Recovery Tank - Weldment	1
2	000-078-039	Vacuum Inlet Stopper Assembly - Recovery Tank	1
3	000-057-015	Gasket, 1-1/2" Bulkhead Fitting	2
4	000-052-219	Adapter, 2" NPT x 2" F Slip	2
5	000-143-539	Screw, #6-32UNC x 0.50" Lg. Button Head Allen	2
6	000-086-008	Latch, Bungie - Strike	1
7	000-094-063	Nut, #6-32UNC Nylock	2
8	000-052-222	Elbow, 2" Barb x 2" FPT	2
9	000-057-202	Gasket, End - Recovery Tank	2
10	000-057-203	Gasket, Middle - Recovery Tank	3
11	000-057-205	Gasket, Side - Recovery Tank - 100 Gallon	2

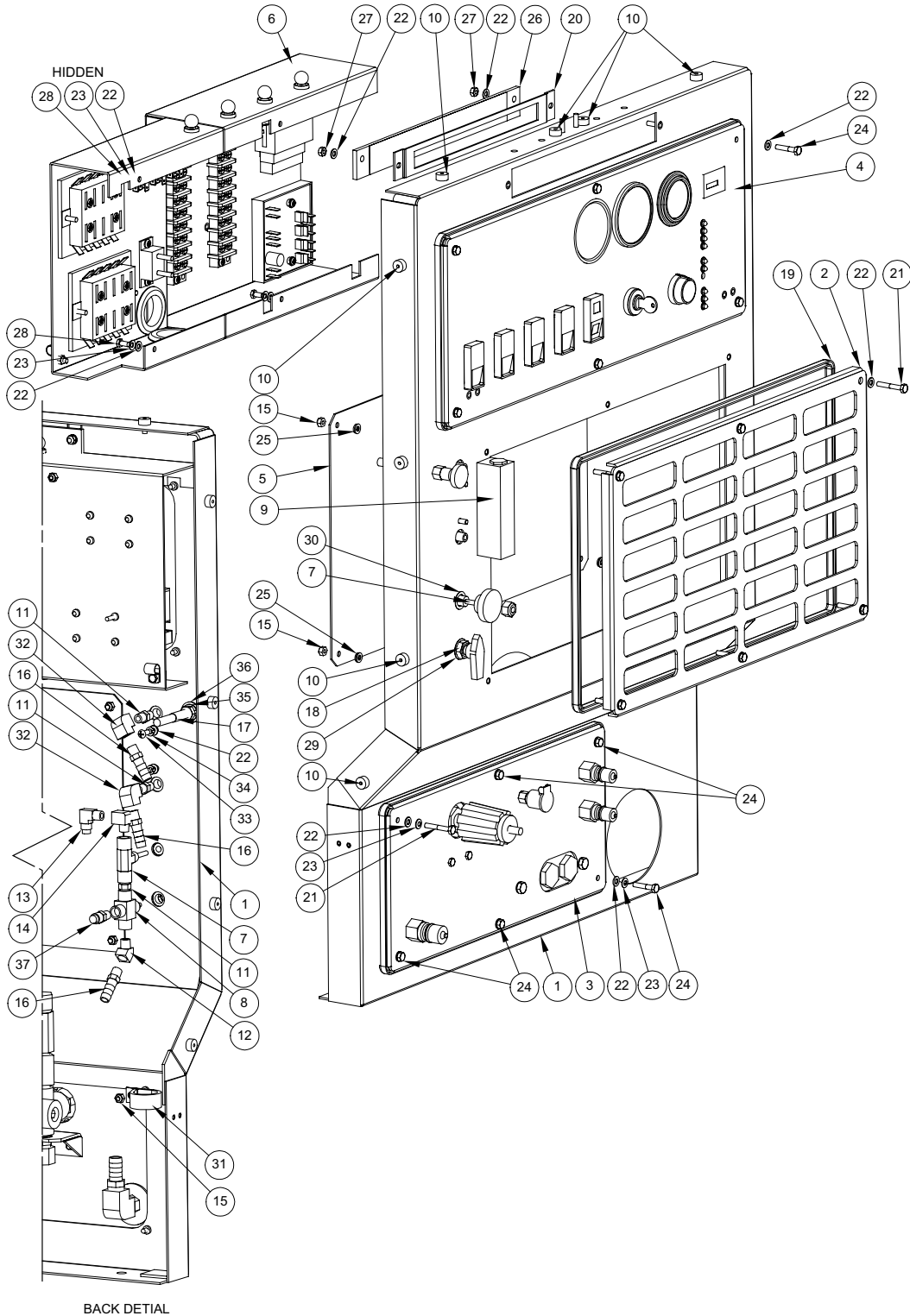
Figure 1-11 Vacuum Relief Valve Assembly
C-6894 Rev -



Vacuum Relief Valve Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-182	Bracket, Vacuum Relief Valve	1
2	000-027-032	Cap, Vacuum Releif Valve	1
3	000-125-111	Pipe, Vacuum Relief Spring Guide	1
4	000-105-332	Plate, Vacuum Relief Valve Mounting - Universal Recovery T	1
5	000-155-026	Spring, Vacuum Relief	1
6	000-143-198	Screw, 3/8"-16UNC x 4" Lg. Hex Head Full Thread	1
7	000-094-077	Nut, 3/8"-16UNC x 1.00" O.D. Knurled	2
8	000-094-101	Nut, 3/8"-16UNC Hex Jam	1

Figure 1-12 Dash Assembly
D-4359 Rev F



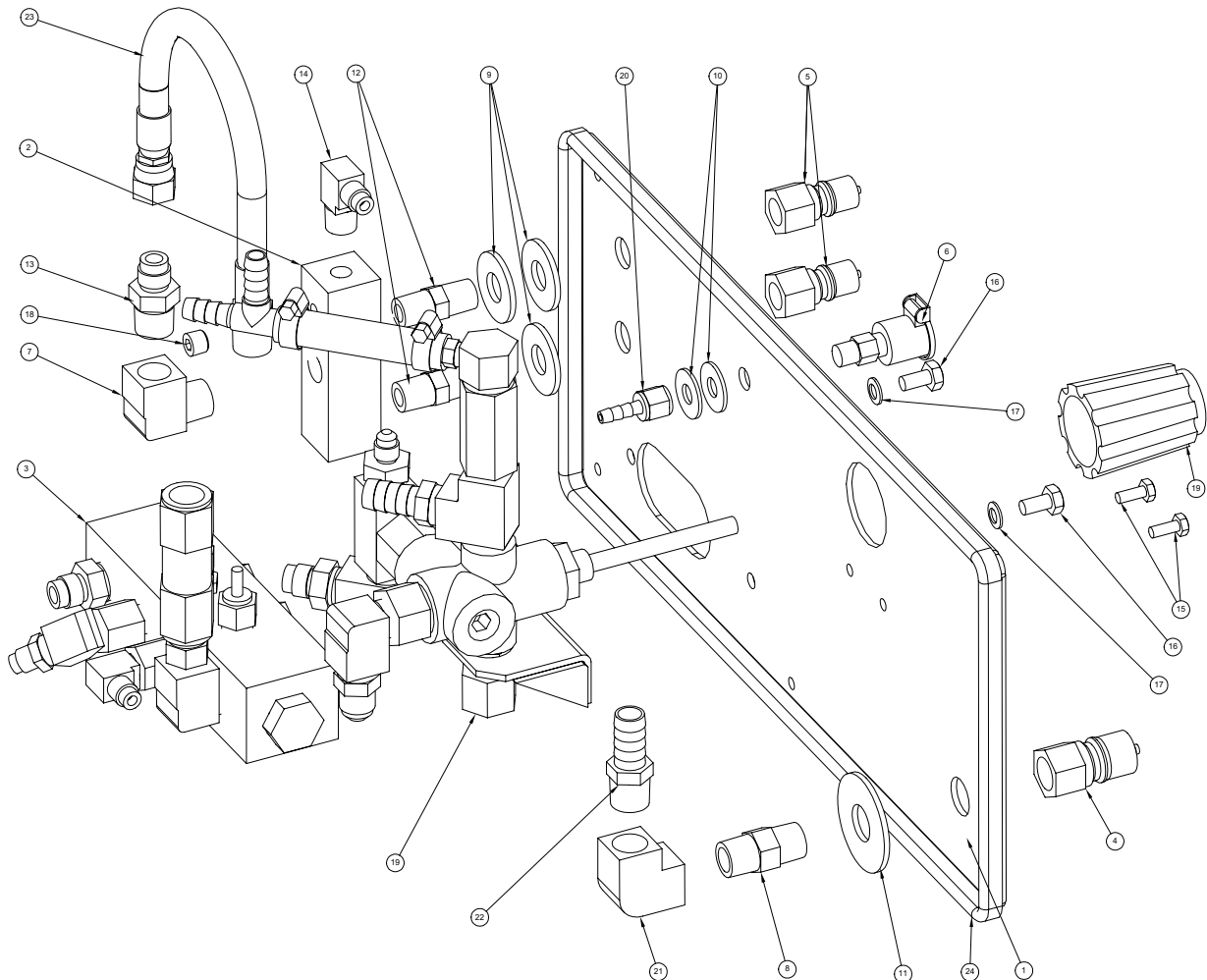
Dash Assembly Parts List

Item	Part Number	Description	Qty
1	000-100-088	Panel, Main Dash - Maxx 450D/470D	1
2	000-100-096	Grill, Upper Dash	1
3	Fig. 1-13	Assembly, Lower Dash Plumbing Connection Panel - Maxx 4	1
4	Fig. 1-14	Assembly, Upper Dash Instrument Panel - Maxx	1
5	000-100-102	Panel, Perforated Grill	1
6	Fig. 1-15	Assembly, Control Panel	1
7	000-169-160	Valve, Chemical Metering	1
8	000-169-0171	Valve, 3-Way Ball O-Ring Style	1
9	000-074-030	Meter, Chemical Flow Raw	1
10	000-108-115	Protector, 5/8" Bumper	12
11	000-052-069	Nipple, 1/8" NPT Hex	3
12	000-052-078	Elbow, 1/8" NPT x 45° Street	1
13	000-052-531	Elbow, 1/8" NPT x 1/4" SAE	1
14	000-052-084	Elbow, 1/8" NPT Street	1
15	000-094-034	Nut, #10-24UNC Nylock	7
16	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	3
17	000-025-011	Cable, Choke (5 Foot)	1
18	000-094-098	Nut, 7/16"-24UNF - 2 Way Metering Valve	1
19	000-131-131	Trimlok, 3/8" x 1/8"	1
20	000-105-221	Plate, HydraMaster Name - Maxx	1
21	000-143-171	Screw, #10-24UNC x 1.25" Lg. Hex Head	7
22	000-174-001	Washer, #10 Flat	26
23	000-155-054	Spring, #10 Belleville Washer	10
24	000-143-134	Screw, #10-24UNC x 1.00" Lg Hex Head	11
25	000-174-036	Washer, #10 Flat Rubber Backed	6
26	000-084-013	Reflector 1.25" x 12" Transparent	1
27	000-094-004	Nut, #10-24UNC Hex	2
28	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	4
29	000-174-030	Washer, 5/8" I.D. x 7/8" O.D. x 0.010" Thk.	1
30	000-174-062	Washer, 1/2" I.D. x 3/4" O.D. x 0.010" Thk.	1

Dash Assembly Parts List

Item	Part Number	Description	Qty
31	000-033-057	Clamp, 1" Cushion Loop	1
32	000-052-089	Elbow, 1/8" NPT Female	2
33	000-143-328	Screw, #10-32UNF x 1/2" Lg. Phillips Head	2
34	000-174-014	Washer, #10 Lock	2
35	000-174-057	Washer, 3/8" Lock	1
36	000-174-032	Washer, 3/8" Flat	1
37	000-052-530	Nipple, 1/8" MNPT x 1/4" SAE	1

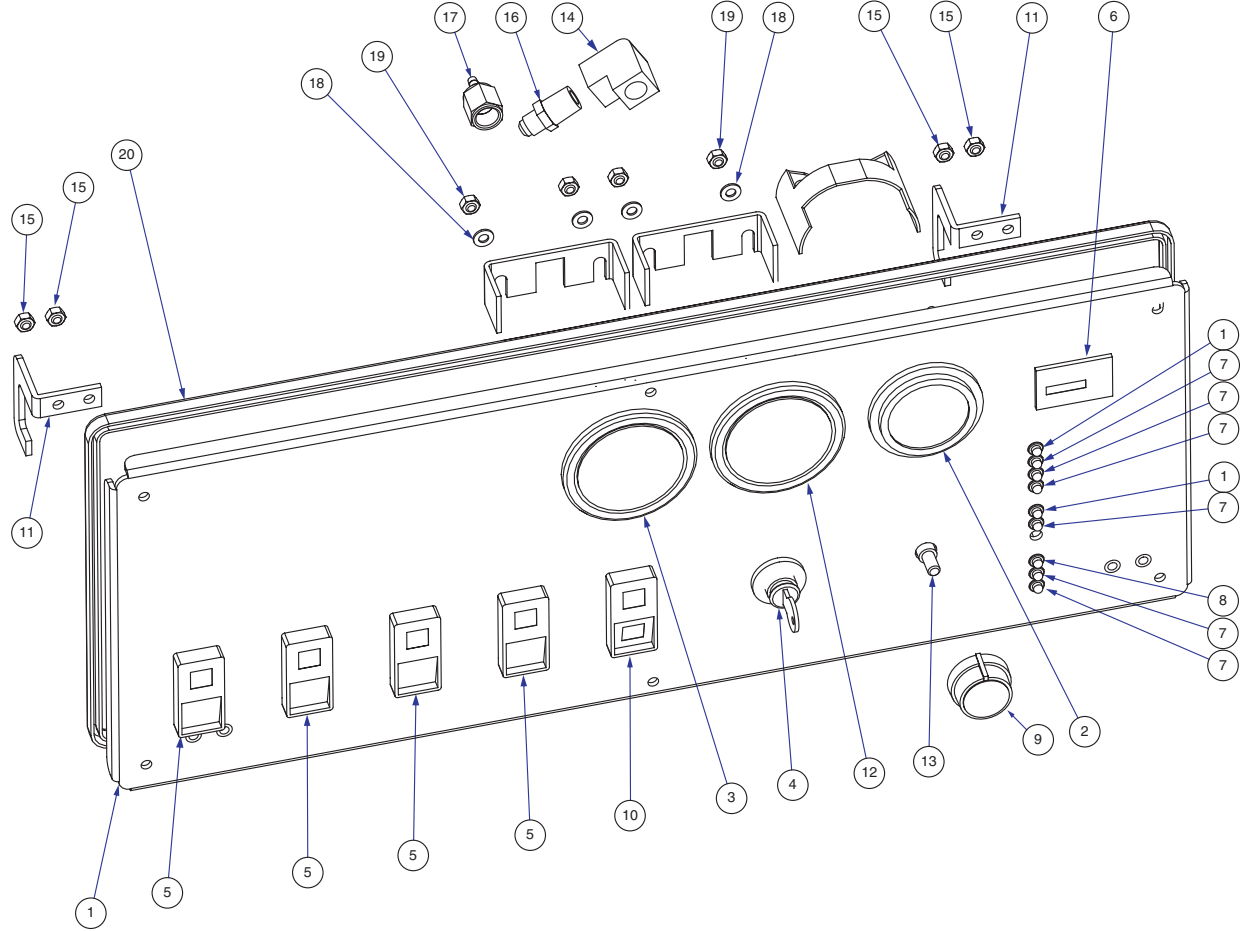
Figure 1-13 Lower Dash Plumbing Connection Panel Assembly
D-4357 Rev D



Lower Dash Plumbing Connection Panel Assembly Parts List

Item	Part Number	Description	Qty
1	000-100-094	Panel, Lower Dash Plumbing Connection	1
2	000-090-008	Manifold, Hi Pressure	1
3	Fig. 1-29	Assembly, Hi-PSI Manifold - Maxx 450D/470D	1
4	000-052-052	Quick Connect, 660 Male w/ Viton Standard	1
5	000-052-050	Quick Connect, 440 Male w/ Viton Standard	2
6	000-052-272	Cup, Gravity Feed Oil Blower Lubrication Port	1
7	000-052-086	Elbow, 3/8" NPT Street	1
8	000-052-074	Nipple, 3/8" NPT Hex	1
9	000-174-007	Washer, 1/2" Flat	4
10	000-174-032	Washer, 3/8" Flat	2
11	000-174-008	Washer, 5/8" Flat	1
12	000-052-071	Nipple, 1/4" NPT Hex	2
13	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	1
14	000-052-532	Elbow, 1/4" SAE x 1/4" JIC x 90°	1
15	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	2
16	000-143-542	Screw, 1/4"-28UNF x 0.50" Lg.	2
17	000-155-053	Spring, 1/4" Belleville Washer	2
18	000-106-009	Plug, 1/8" NPT Allen Head	1
19	Fig. 1-30	Assembly, By-Pass Valve - Maxx 450DD	1
20	000-052-096	Insert, #F23 (1/8" FPT x 3/16" Barb)	1
21	000-052-142	Elbow, 3/8" FPT x FPT	1
22	000-052-105	Insert, #68 (3/8" NPT x 1/2" Barb)	1
23	000-068-513	Hose, 3/8" x 10" Teflon w/ F JIC End & 3/8" NPT	1
24	000-131-131	Trimlok, 3/8" x 1/8"	1

Figure 1-14 Upper Dash Instrument Panel Assembly
C-4356 Rev A



Upper Dash Instrument Panel Assembly Parts List

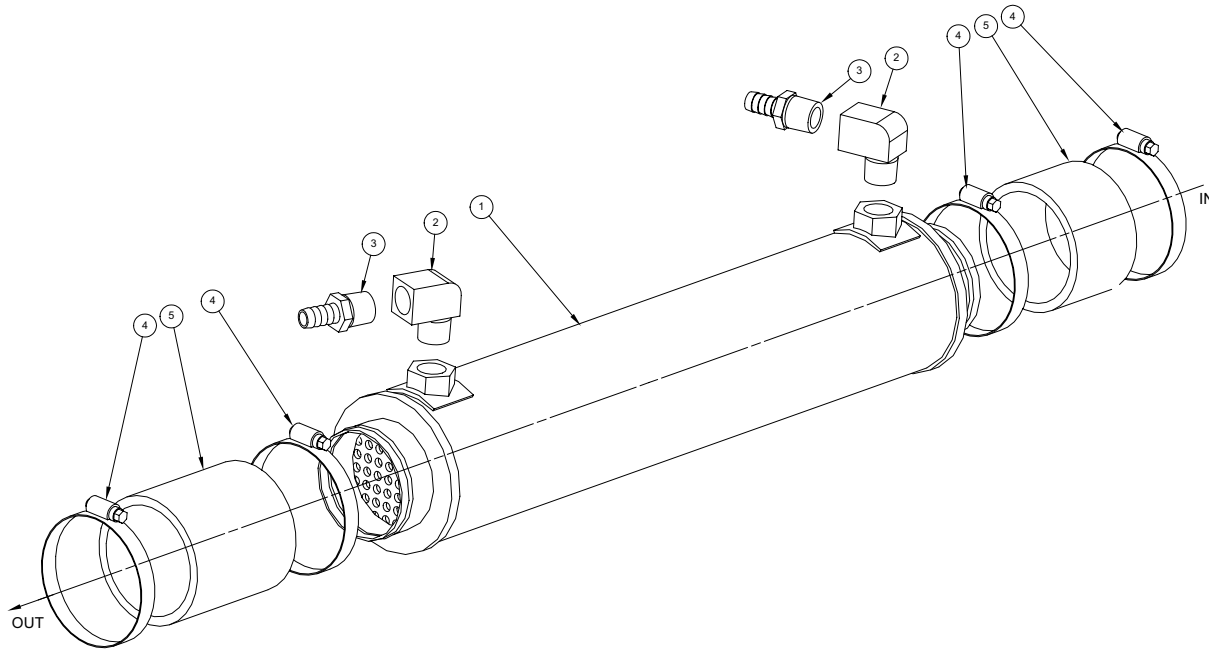
Item	Part Number	Description	Qty
1	000-100-092	Panel, Upper Dash Instrument	1
2	000-074-016	Guage, Temperature	1
3	000-074-017	Guage, 0-30" Hg Vac. 2 1/2" HydraMaster Face	1
4	000-157-008	Switch, Ignition	1
5	000-157-040	Switch, 20 AMP Rocker	4
6	000-074-018	Meter, Rectangular w/o Bezel	1
7	000-084-011	Light, Red Led Indicator Mini	6
8	000-084-010	Light, Green Led Indicator Mini	3
9	000-061-056	Knob, Temperature Adjustment	1
10	000-157-131	Switch, 3 Way Speed Control	1
11	000-015-566	Bracket, Upper Dash Instrument Hinge	2
12	000-074-007	Gauge, 2" Dia. 0-1500 PSI	1
13	000-149-047	Thermostat, n/s Temperature Controller	1
14	000-052-088	Elbow, 1/4" FPT x FPT	1
15	000-094-034	Nut, #10-24UNC Nylock	4
16	000-052-527	Nipple, 1/4" SAE x 1/4" NPT	1
17	000-052-652	Insert, #F42 (1/4" FPT x 1/8" Barb)	1
18	000-174-001	Washer, #10 Flat	4
19	000-094-070	Nut, 5mm Nylock	4
20	000-131-131	Trimlok, 3/8" x 1/8"	1

Electrical Control Panel Assembly Parts List

Item	Part Number	Description	Qty
1	000-100-100	Panel, Control Mount	1
2	000-074-110	Controller, Temp. Analog	1
3	000-012-010	Block, Terminal 10 Post	2
4	000-084-009	Lamp, Socket - Dashboard	4
5	000-084-004	Lamp, Replacement Guage	4
6	000-060-010	Grommet, 1-5/16" I.D.	2
7	000-056-020	Fuse Panel	1
8	000-056-030	Diode Panel	1
9	000-018-040	Circuit Breaker, 50 AMP	1
10	000-157-022	Switch, Relay	3
11	000-143-062	Screw, #10-24UNC x 0.75" Lg. Pan Head Phillips	4
12	000-094-034	Nut, #10-24UNC Nylock	10
13	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	3
14	000-143-545	Screw, #8-32UNC x 1.00" Lg. Phillips Head	9
15	000-143-533	Screw, #10-24UNC x 0.25" Lg. Pan Head Phillips	2
16	000-174-014	Washer, #10 Lock	10
17	000-143-298	Screw, #8-32UNC x 1.50" Lg. Pan Head Phillips	1
18	000-033-044	Clamp, 3/8" Tube	1
19	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	1
20	000-072-010	Ignition Processor - 700G Daihatsu	1
21	000-072-009	Ignition Processor - 950G Daihatsu	1
22	000-029-016	Governor, Hall Affects Maxx 450D/470DD	1
23	000-029-030	Governor, Magnetic Pick Up - Maxx Diesel	1

Figure 1-16 Bypass Heat Exchanger

C-4587 Rev C

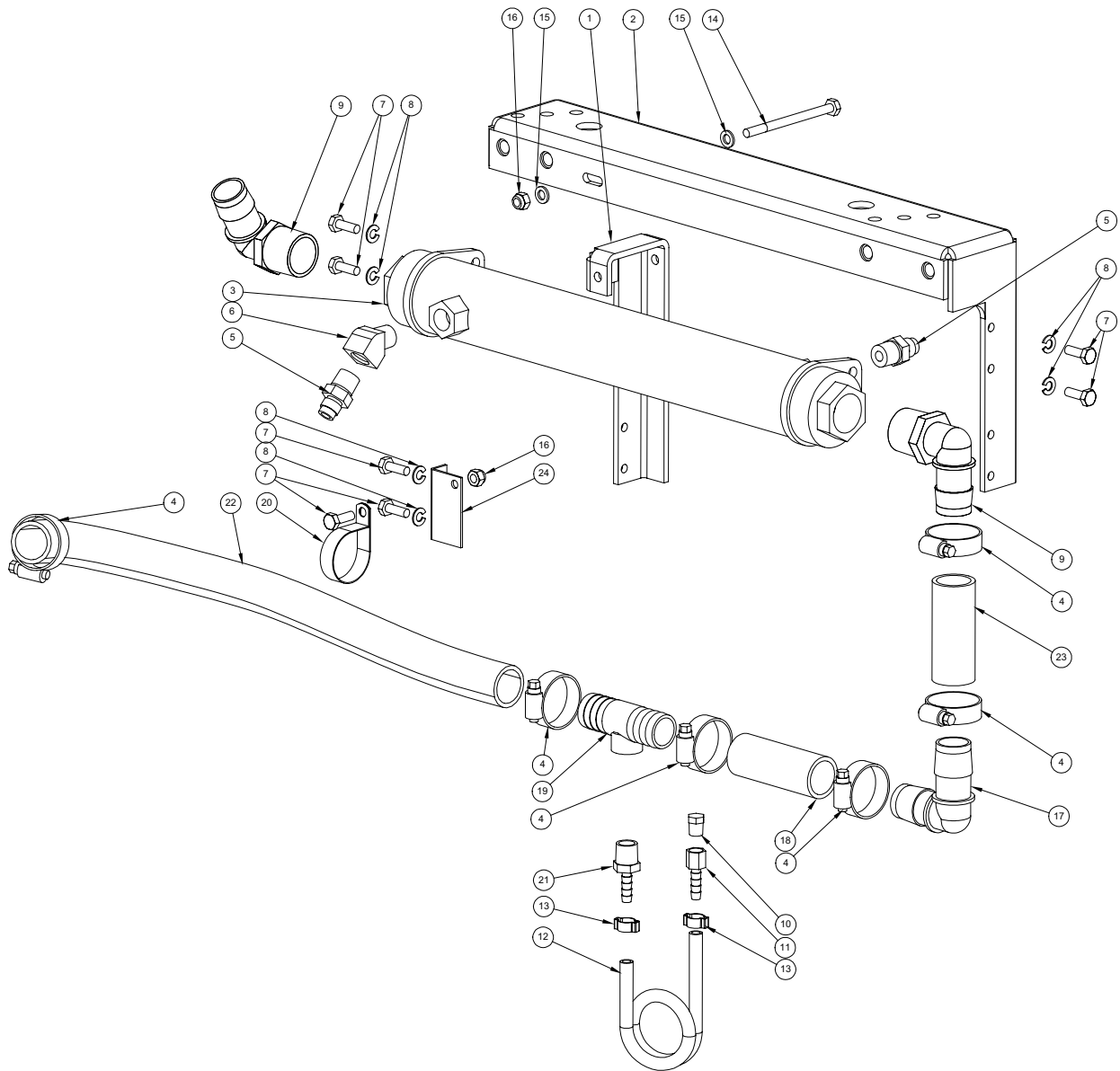


Bypass Heat Exchanger Parts List

Item	Part Number	Description	Qty
1	000-038-031	Core, 4" x 19" Tube & Shell Hx w/ 3" Ends	1
2	000-052-087	Elbow, 1/2" NPT Street	2
3	000-052-107	Insert, #88 (1/2" NPT x 1/2" Barb)	2
4	000-033-013	Clamp, Size #48 Hose	4
5	000-068-008	Hose, 3" Type 54 Nitrile	2

Figure 1-17 Water-to-Water Heat Exchanger - Maxx 450/470

D-5995 Rev A

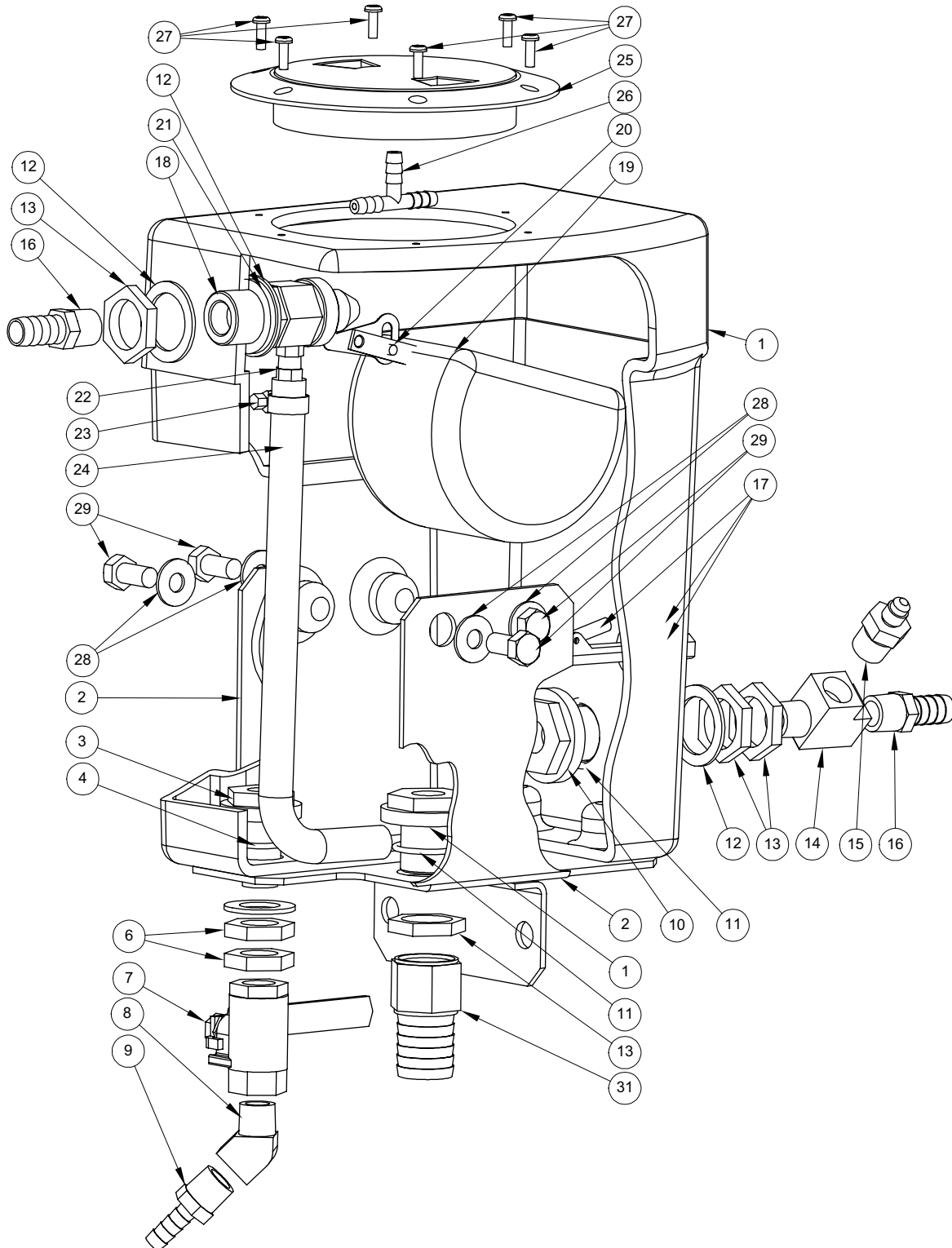


Water-to-Water Heat Exchanger Parts List

Item	Part Number	Description	Qty
1	000-015-739	Bracket, Dual Hx Mounting - Right	1
2	000-015-735	Bracket, Dual Hx Mounting Channel	1
3	000-038-043	Heat Exchanger, Water To Water	1
4	000-033-020	Clamp, Size #16 Hose	6
5	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	2
6	000-052-083	Elbow, 3/8" NPT Street x 45°	1
7	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	7
8	000-174-019	Washer, 1/4" Lock	6
9	000-052-131	Elbow, 1"NPT x 1"Barb (Glass Filled Black Nylon)	2
10	000-106-001	Plug, 1/8" NPT	1
11	000-052-109	Insert, #F24 (1/8" NPT x 1/4" Barb)	1
12	000-068-015	Hose, 1/4" Black Rubber	1
13	000-033-017	Clamp, 1/4" I.D. Hose	2
14	000-143-181	Screw, 1/4"-20UNC x 3.50" Lg.	1
15	000-174-003	Washer, 1/4" Flat	2
16	000-094-009	Nut, 1/4"-20UNC Hex Nylock	2
17	000-052-091	Elbow, 1" Barb x 1" Barb (For Radiator Hose)	1
18	000-068-250	Hose, 1" Green Stripe - Bulk	1
19	000-001-019	Adapter, Lower Radiator Tee (1" Barb x 1" Barb x 3/8" Fpt)	1
20	000-033-053	Clamp, 1-1/2" Cushion Loop	1
21	000-052-103	Insert, #64 (3/8" NPT x 1/4" Barb)	1
22	000-068-250	Hose, 1" Green Stripe	1
23	000-068-250	Hose, 1" Green Stripe - Bulk	1
24	000-015-402	Bracket, Hose Clamp	1

Figure 1-18 Water Box Assembly

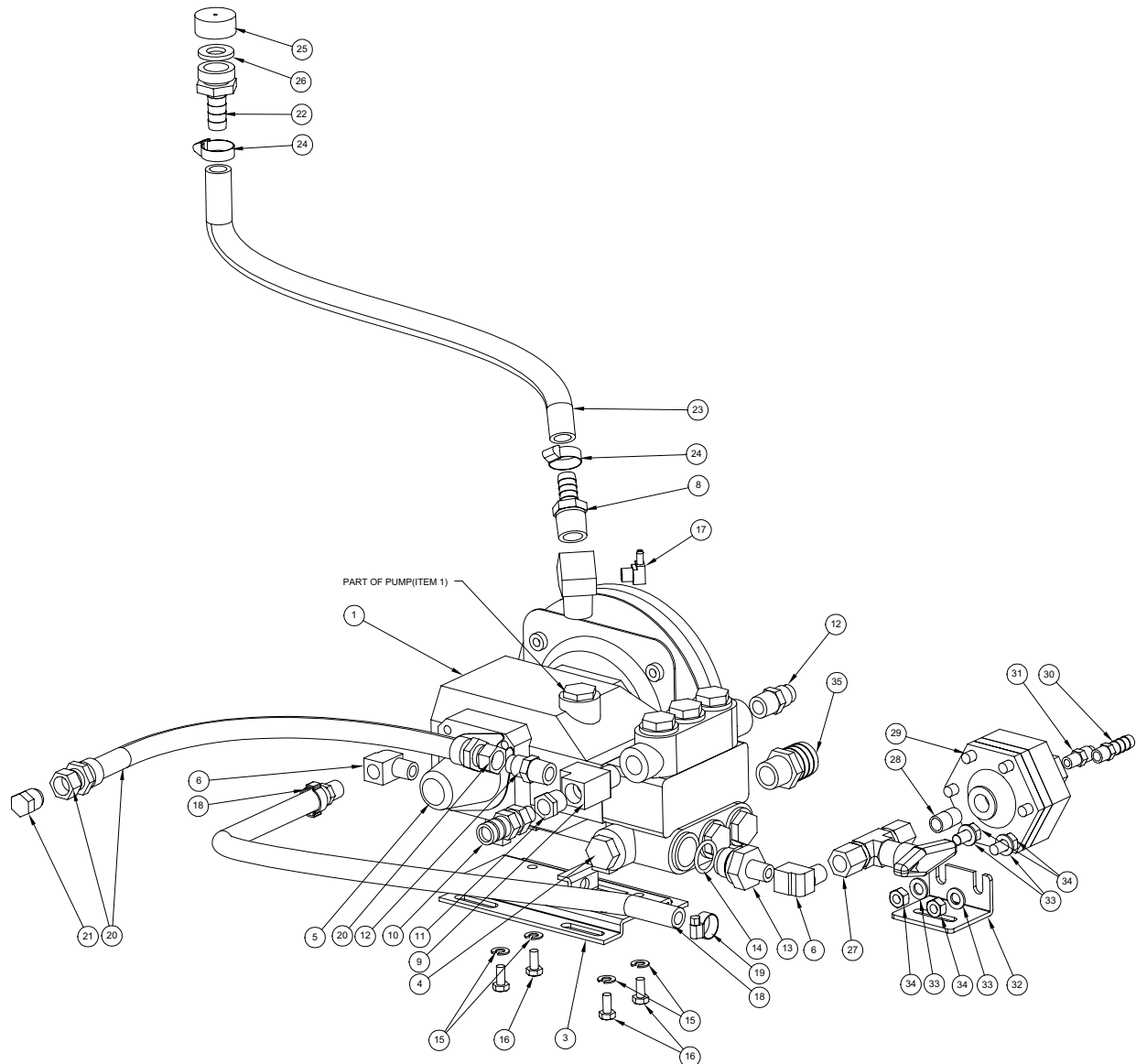
D-4732 Rev H



Water Box Assembly Parts List

Item	Part Number	Description	Qty
1	000-159-105	Tank, Poly Water Box - Modified	1
2	000-015-640	Bracket, Water Box Mounting - Weldment	1
3	000-052-659	Bulkhead, 3/8" Mpt x Straight	1
4	000-097-042	O-Ring, Bulkhead Fitting w/ 3/8" NPT	1
5	000-174-027	Washer, 3/4" Flat	1
6	000-094-096	Nut, 3/4-16 Brass Water Box	2
7	000-169-064	Valve, 3/8" NPT Full Port Ball	1
8	000-052-083	Elbow, 3/8" NPT Street x 45°	1
9	000-052-104	Insert, #66 (3/8" NPT x 3/8" Barb)	1
10	000-052-660	Bulkhead, 3/8" FPT x 3/8" FPT	1
11	000-097-041	O-Ring, 1/2" Bulkhead	2
12	000-174-063	Washer, 1.5" O.D. x 1.073" I.D. x 0.075" Thk.	3
13	000-094-097	Nut, 1-14" Brass Water Box	4
14	000-052-023	Tee, 3/8" NPT Male Street	1
15	000-052-662	Nipple, 3/8" NPT x 1/4" M SAE	1
16	000-052-105	Insert, #68 (3/8" NPT x 1/2" Barb)	2
17	000-157-031	Switch, Side Mount w/ Bulkhead Fitting	1
18	000-169-167	Valve, Mechanical Incoming Water - Water Box	1
19	000-005-007	Float, Water Box	1
20	000-143-336	Screw, #10-32UNF x 0.25" Lg. Pan Head Phillips	1
21	000-057-052	Gasket, 1" Garden Hose	1
22	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	1
23	000-033-005	Clamp, Size #5 Hose	1
24	000-068-326	Hose, 3/8" Clear Braid Solution	1
25	000-041-365	Cover, 4" Round Poly Water Box	1
26	000-052-156	Tee, 1/4" Plastic Vacuum Insert	1
27	000-143-314	Screw, #8 x 1/2" Lg. Pan Head	6
28	000-174-032	Washer, 3/8" Flat	4
29	000-143-017	Screw, 3/8"-16UNC x 3/4" Lg. Hex Head	4
30	000-052-728	Bulkhead, 1/2" FPT x 3/8" FPT	1
31	000-052-754	Insert, #F816 (1/2" FPT x 1" Barb)	1

Figure 1-19 CAT 3CP Pump Assembly
D-4354 Rev F



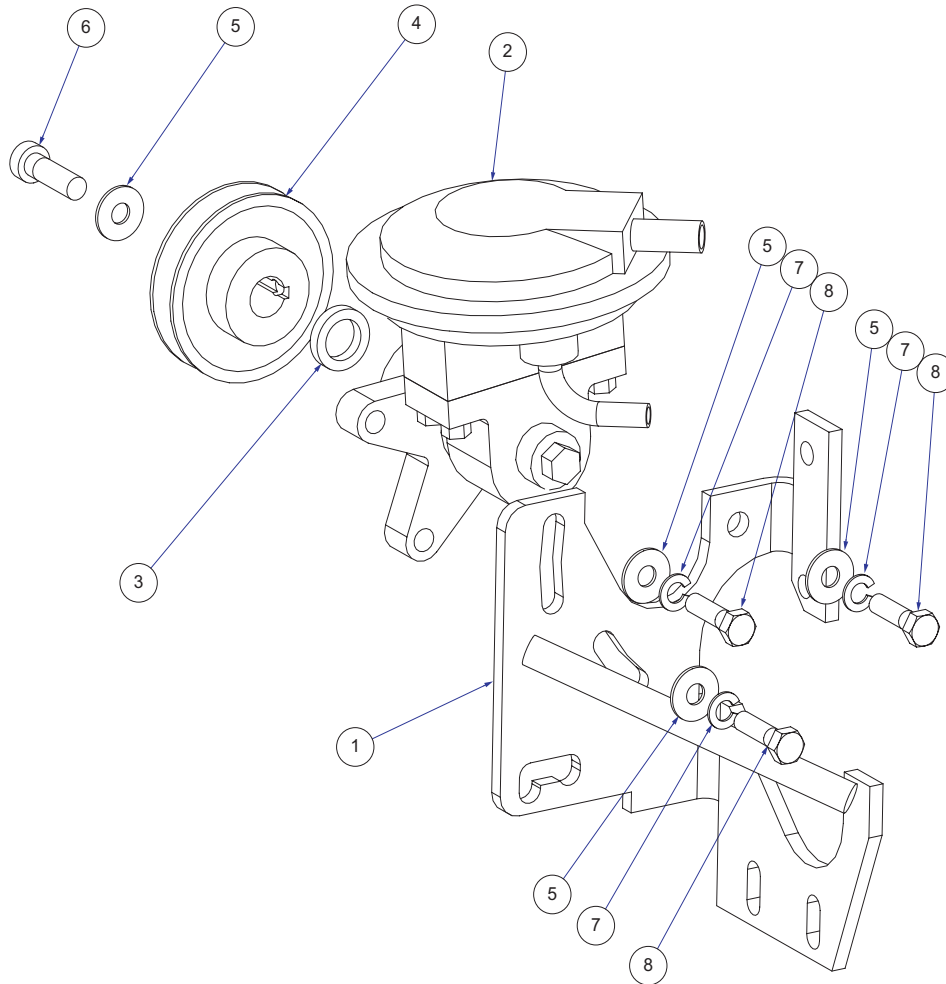
CAT 3CP Pump Assembly Parts List

Item	Part Number	Description	Qty
1	000-111-070	Pump, 4 Gpm CAT Hi Temp. Plunger	1
2	000-036-006	Clutch, Pump - CDS 4.8/ Maxx	1
3	000-015-682	Bracket, Pump Mount CAT 3CP	1
4	000-106-004	Plug, 1/2" NPT Hex	1
5	000-108-055	Protector, CAT 3CP Shaft	1

CAT 3CP Pump Assembly Parts List

Item	Part Number	Description	Qty
6	000-052-085	Elbow, 1/4" NPT Street	2
7	000-052-710	Elbow, 1/2" NPT x 45° Street - Modified	1
8	000-052-107	Insert, #88 (1/2" NPT x 1/2" Barb)	1
9	000-052-023	Tee, 3/8" NPT Male Street	1
10	000-169-050	Valve, High Pressure Safety (2200)	1
11	000-052-061	Bushing, 3/8" NPT x 1/4" FPT	1
12	000-052-128	Nipple, 3/8" NPT x 3/8" Male Propane	2
13	000-001-082	Adapter, Chemical Pump To CAT 3CP	1
14	000-097-057	O-Ring, Adapter - Chemical Pump	1
15	000-174-019	Washer, 1/4" Lock	4
16	000-143-221	Screw, M6-1 x 14mm Lg. Hex Head	4
17	000-052-106	Insert, 1/8" NPT x 5/32" Barb x 90°	1
18	000-068-523	Hose, 3/8" x 17" Lg. Hi Temp Oil Drain	1
19	000-033-005	Clamp, Size #5 Hose	1
20	000-068-587	Hose, Throb	1
21	000-052-656	Plug, SAE Flare For Throb Hose - Maxx	1
22	000-052-160	Insert, 3/4" M Garden x 1/2" Barb	1
23	000-068-086	Hose, 1/2" I.D. Hi-Temp	1
24	000-033-006	Clamp, Size #8 Hose	2
25	000-027-116	Cap, Garden Hose - Modified	1
26	000-057-055	Gasket, Garden Hose	1
27	000-169-176	Valve, 2 Way Chemical Pump	1
28	000-052-517	Nipple, 1/4" NPT Close	1
29	Fig. 1-21	Assembly, Chemical Pump - Boxxer 427	1
30	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	1
31	000-052-530	Nipple, 1/8" MNPT x 1/4" SAE	1
32	000-015-933	Bracket, Chemical Pump Support	1
33	000-174-049	Washer, 5/16" Flat	4
34	000-094-013	Nut, 5/16"-24UNF Hex	4
35	000-052-753	Insert, #816 (1/2" NPT x 1" Barb)	1

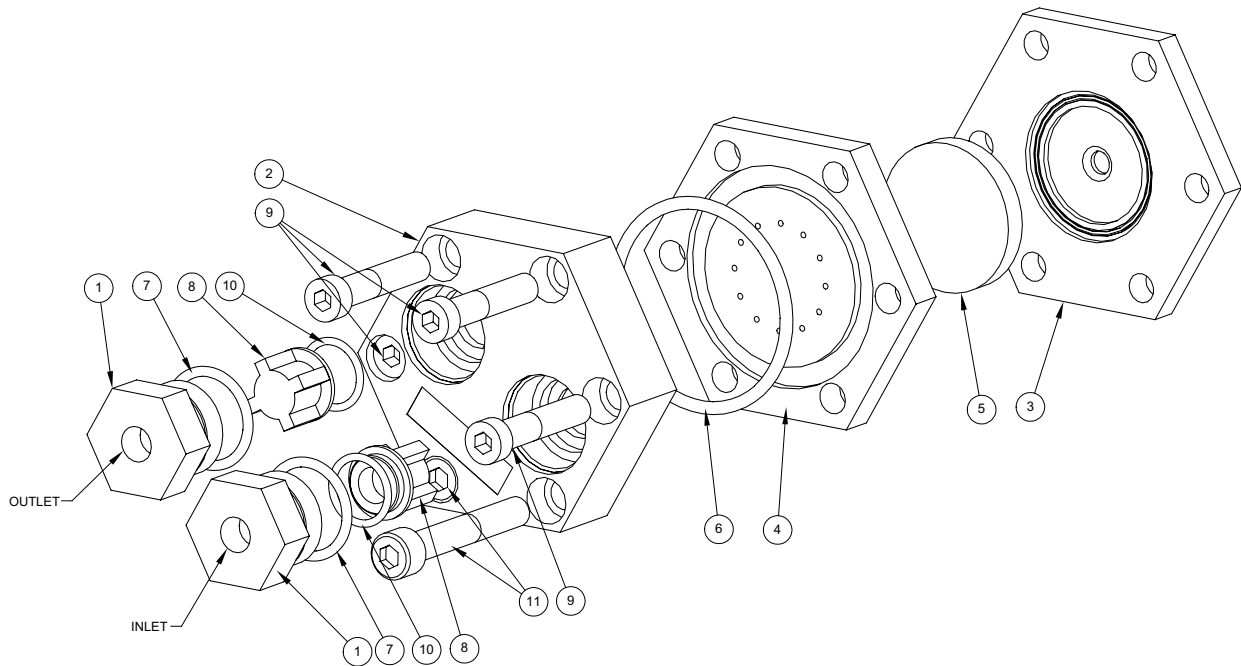
Figure 1-20 Air Pump Assembly
C-5383 Rev A



Air Pump Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-724	Bracket, Air Pump / Alternator Mounting	1
2	000-111-085	Pump, Air N/S	1
3	000-154-092	Spacer, Air Pump Pulley - 17mm Bore	1
4	000-109-083	Pulley, AK30 Mod. To 17mm Bore - Maxx	1
5	000-174-004	Washer, 5/16" Flat	4
6	000-143-029	Screw, 3/8"-16UNC x 1.25" Lg. Torx Plus Button Head	1
7	000-174-018	Washer, 5/16" Lock	3
8	000-143-083	Screw, 8mm x 30mm Lg. Grade 8 Hex Head	3

Figure 1-21 **Chemical Pump Assembly**
C-6555 Rev A

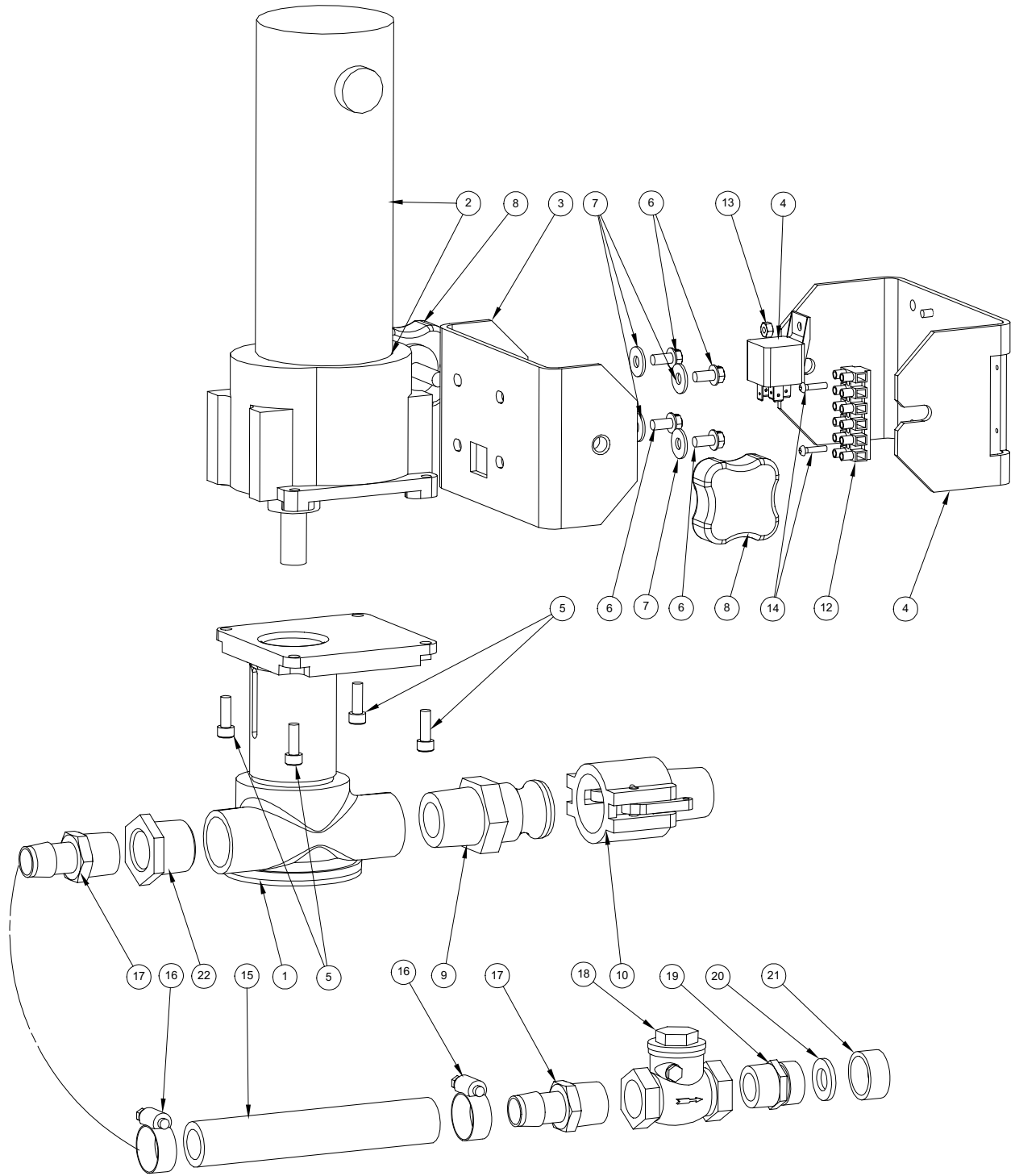


Chemical Pump Assembly Parts List

Item	Part Number	Description	Qty
1	000-106-110	Plug, Check Valve - Chemical Pump	2
2	000-064-015	Cover, Chemical Pump	1
3	000-111-030	Body, Chemical Pump	1
4	000-105-071	Mid Plate, Chemical Pump	1
5	000-046-010	Diaphragm, Chemical Pump	1
6	000-097-055	O-Ring, Chemical Pump Midplate An Size -227 Viton	1
7	000-097-056	O-Ring, Check Valve Plug - Chemical Pump	2
8	000-169-155	Valve, Check, - Last Step Chemical Injection	2
9	000-143-152	Screw, 5/16"-24UNF x 1.50" Lg. Socket Head	4
10	000-097-054	O-Ring, Chem. Pump Valve Viton-Parker 2-114	2
11	000-143-574	Screw, 5/16"-24UNF x 2" Lg. Soc. Head Grade L9	2

Figure 1-22 Dura-Flow APO Assembly (Automatic Pump Out)

D-5654 Rev E



Dura-Flow APO Assembly Parts List

Item	Part Number	Description	Qty
1	000-111-169	Assembly, APO Pump - Jabsco	1
2	000-091-042	Motor, Bison 438 Series	1
3	000-015-891	Bracket, APO Clamp	1
4	000-015-890	Bracket, Tank Mounted APO Support	1
5	000-143-566	Screw, 1/4-28UNF x 0.75" Lg. Socket Head	4
6	000-143-074	Screw, 1/4"-20UNC x 0.50" Lg. Hex Head Self-Tapping	4
7	000-174-002	Washer, 1/4" Flat	4
8	000-061-131	Knob, Handle - Rdm	2
9	000-052-723	Fitting, 1" NPT Cam Lock - Banjo 100F	1
10	000-052-724	Fitting, 1" NPT Cam Lock - Banjo 100B	1
11	000-157-022	Switch, Relay	1
12	000-012-011	Block, 6 Post	1
13	000-094-027	Nut, #10-24UNC Hex	1
14	000-143-532	Screw, #6-32UNC x 5/8" Lg. Socket Head	2
15	000-068-069	Hose, 3/4" I.D. Weatherhead - Blue - Bulk.	1
16	000-033-026	Clamp, Size #10 Hose	2
17	000-052-338	Insert, #1212 (3/4" NPT x 3/4" Barb)	2
18	000-169-009	Valve, 3/4" FPT Swing Check	1
19	000-052-281	Nipple, 3/4" NPT x 3/4" Male Garden Hose	1
20	000-057-055	Gasket, Garden Hose	1
21	000-027-014	Cap, Garden Hose	1
22	000-052-425	Bushing, 1" NPT x 3/4" FPT	1

Figure 1-23 Fuel Pump Assembly
B-4627 Rev -

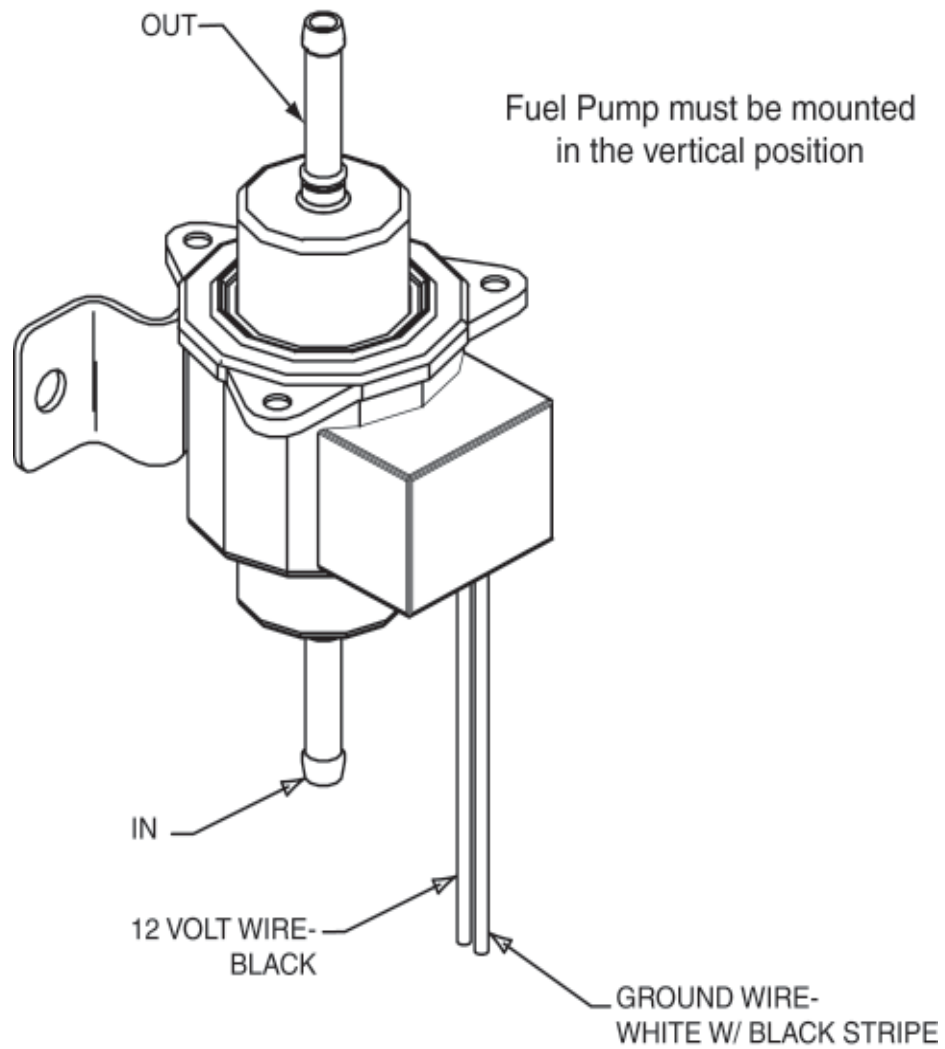
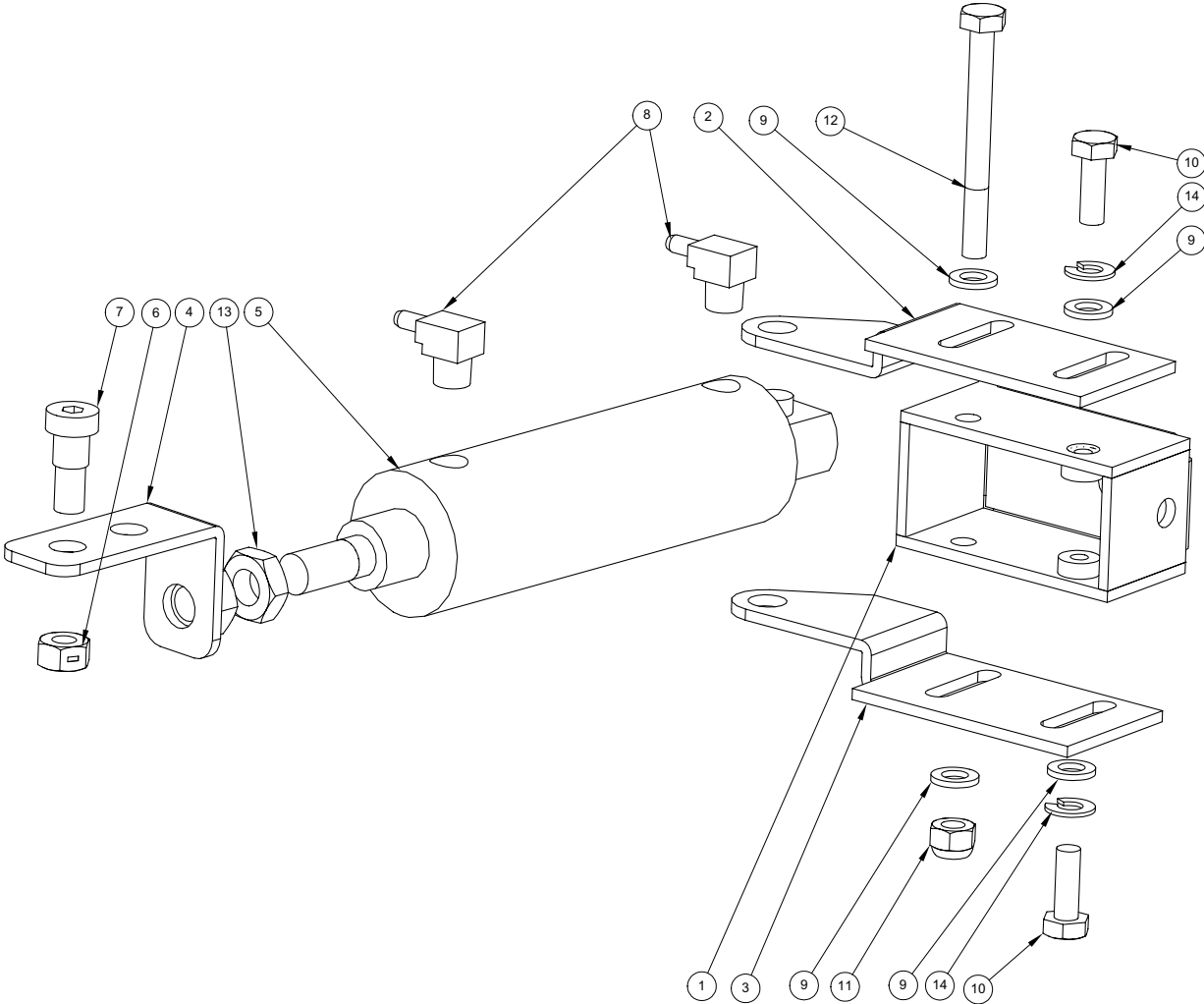


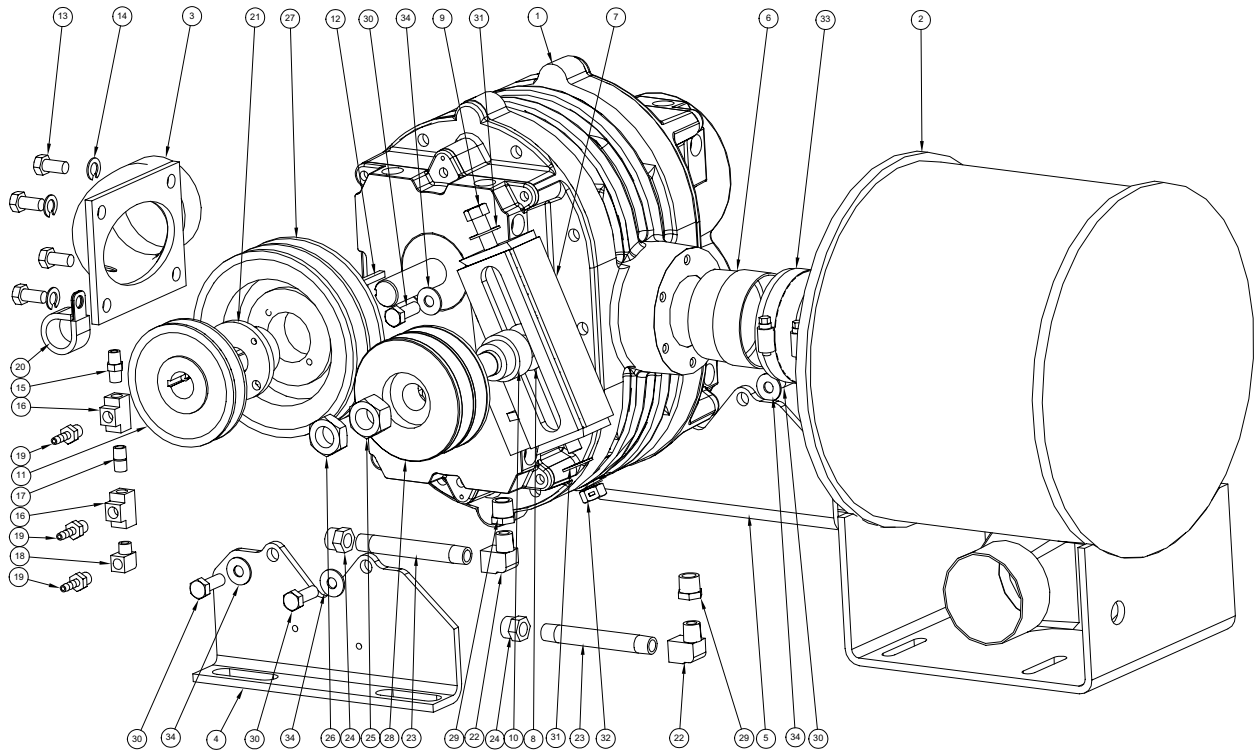
Figure 1-24 Diverter Valve Actuator Assembly
C-5386 Rev B



Diverter Valve Actuator Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-772	Bracket, Diverter Air Cylinder Mounting	1
2	000-015-774	Bracket, Diverter Air Cylinder Foot - Top	1
3	000-015-774	Bracket, Diverter Air Cylinder Foot- Bottom	1
4	000-015-630	Bracket, Air Cylinder Extension	1
5	000-169-169	Valve, Air Cylinder	1
6	000-094-081	Nut, 5/16"-18UNC Hex 2-Way Locking	1
7	000-143-573	Screw, 5/16-18 Shoulder, 3/8" Dia x 1/2"	1
8	000-052-106	Insert, 1/8" NPT x 5/32" Barb x 90°	2
9	000-174-003	Washer, 1/4" Flat	4
10	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	2
11	000-094-009	Nut, 1/4"-20UNC Hex Nylock	1
12	000-143-009	Screw, 1/4"20UNC x 2.50" Lg. Hex Head	1
13	000-094-092	Nut, 7/16"-20UNF Hex Jam	1
14	000-174-019	Washer, 1/4" Lock	2

Figure1-25 Blower MD 4005 Assembly
D-5384 Rev C



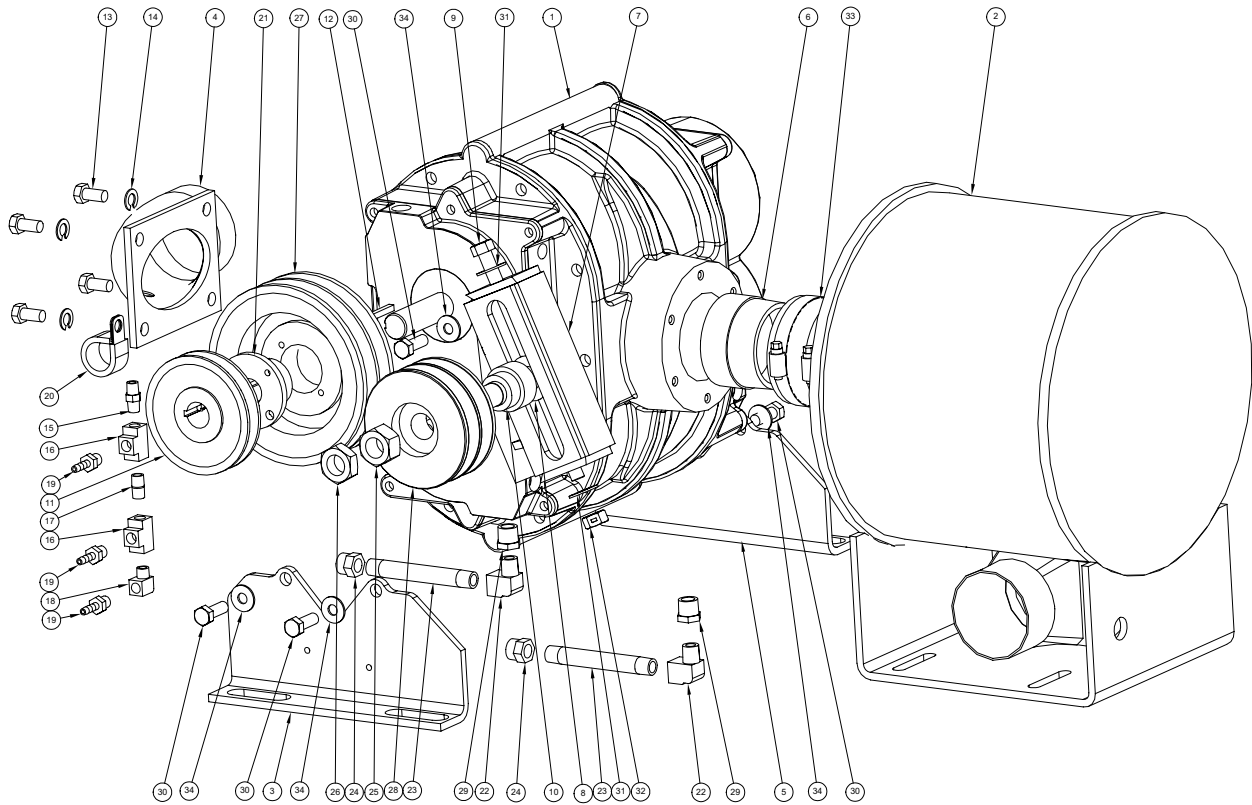
Blower MD 4005 Assembly Parts List

Item	Part Number	Description	Qty
1	000-111-145	Blower, 4005 Dominator	1
2	000-093-082	Silencer, Bolt Down - Maxx 470D/Javelin	1
3	000-001-041	Adapter, Blower Inlet	1
4	000-015-633	Bracket, Blower Foot Front	1

Blower MD 4005 Assembly Parts List

Item	Part Number	Description	Qty
5	000-015-634	Bracket, Blower Foot Mount Rear	1
6	000-001-101	Adapter, 2-1/2" NPT x 3" M Slip	1
7	000-015-781	Bracket, Idler Mounting - Maxx/Javelin	1
8	000-150-055	Bolt, Idler Pulley Shoulder - Maxx 450D/470D	1
9	000-143-552	Screw, 7/16"-14UNC x 7.875" Lg. Hex Head Grade 5	1
10	000-154-113	Spacer, 0.790 Id x 1.090 Lg. Idler Pulley - Maxx w/ Sheet Fra	1
11	000-109-074	Pulley, AK41 Bored 7/8"	1
12	000-077-001	Key, #3 & #4 Vacuum Pump Drive	1
13	000-143-017	Screw, 3/8"-16UNC x 0.75" Lg. Hex Head Grd. 8	4
14	000-174-021	Washer, 3/8" Lock	4
15	000-052-069	Nipple, 1/8" NPT Hex	1
16	000-052-092	Tee, 1/8" FPT	2
17	000-052-057	Nipple, 1/8" NPT Close	1
18	000-052-084	Elbow, 1/8" NPT Street	1
19	000-052-293	Insert, #23 (1/8" NPT x 3/16" Barb)	3
20	000-033-117	Clamp, 1" Cushion Loop w/ 7/16" Mount Hole	1
21	000-020-019	Bushing, #H x 7/8" Bore	1
22	000-052-085	Elbow, 1/4" NPT Street	2
23	000-052-647	Nipple, 1/4" NPT x 4" Lg.	2
24	000-027-010	Cap, 1/4" NPT	2
25	000-094-105	Nut, 3/4"-16UNF Hex Zink Plated	1
26	000-094-106	Nut, 3/4"-16UNF Hex Jam - Zink Plated	1
27	000-109-100	Pulley, 6" Dual V Belt - Maxx	1
28	000-109-110	Pulley, Dual Belt Idler - Maxx 450D/470D	1
29	000-052-061	Bushing, 3/8" NPT x 1/4" FPT	2
30	000-143-018	Screw, 3/8"-16UNC x 1.00" Lg. Grade 8	6
31	000-174-005	Washer, 3/8" Flat	2
32	000-094-102	Nut, 7/16"-14UNC Two-Way Locking Hex	1
33	000-068-522	Hose, 3 " x 2-1/4" Silicon w/ Clamps	1
34	000-174-032	Washer, 3/8" Flat	6

Figure1-26 **Blower MD 4007 Assembly**
D-5385 Rev C



Blower MD 4007 Assembly Parts List

Item	Part Number	Description	Qty
1	000-111-147	Blower, MD 4007	1
2	000-093-082	Silencer, Bolt Down - Maxx 470D/Javelin	1
3	000-015-633	Bracket, Blower Foot Front	1
4	000-001-041	Adapter, Blower Inlet	1

Blower MD 4007 Assembly Parts List

Item	Part Number	Description	Qty
5	000-015-634	Bracket, Blower Foot Mount Rear	1
6	000-001-101	Adapter, 2-1/2" NPT x 3" M Slip	1
7	000-015-781	Bracket, Idler Mounting - Maxx/Javelin	1
8	000-150-055	Bolt, Idler Pulley Shoulder - Maxx 450D/470D	1
9	000-143-552	Screw, 7/16"-14UNC x 7.875" Lg. Hex Head Grade 5	1
10	000-154-113	Spacer, 0.790 ID x 1.090 Lg. Idler Pulley - Maxx w/ Sheet Fra	1
11	000-109-074	Pulley, AK41 Bored 7/8"	1
12	000-077-001	Key, #3 & #4 Vacuum Pump Drive	1
13	000-143-017	Screw, 3/8"-16UNC x 0.75" Lg. Hex Head Grd. 8	4
14	000-174-021	Washer, 3/8" Lock	4
15	000-052-069	Nipple, 1/8" NPT Hex	1
16	000-052-092	Tee, 1/8" FPT	2
17	000-052-057	Nipple, 1/8" NPT Close	1
18	000-052-084	Elbow, 1/8" NPT Street	1
19	000-052-293	Insert, #23 (1/8" NPT x 3/16" Barb)	3
20	000-033-117	Clamp, 1" Cushion Loop w/ 7/16" Mount Hole	1
21	000-020-019	Bushing, #H x 7/8" Bore	1
22	000-052-085	Elbow, 1/4" NPT Street	2
23	000-052-647	Nipple, 1/4" NPT x 4" Lg.	2
24	000-027-010	Cap, 1/4" NPT	2
25	000-094-105	Nut, 3/4"-16UNF Hex Zink Plated	1
26	000-094-106	Nut, 3/4"-16UNF Hex Jam - Zink Plated	1
27	000-109-100	Pulley, 6" Dual V Belt - Maxx	1
28	000-109-110	Pulley, Dual Belt Idler - Maxx 450D/470D	1
29	000-052-061	Bushing, 3/8" NPT x 1/4" FPT	2
30	000-143-018	Screw, 3/8"-16UNC x 1.00" Lg. Grade 8	6
31	000-174-005	Washer, 3/8" Flat	2
32	000-094-102	Nut, 7/16"-14UNC Two-Way Locking Hex	1
33	000-068-522	Hose, 3 " x 2-1/4" Silicon w/ Clamps	1
34	000-174-032	Washer, 3/8" Flat	6

Figure 1-27 Exhaust Assembly - View 1
D-4541 Rev F

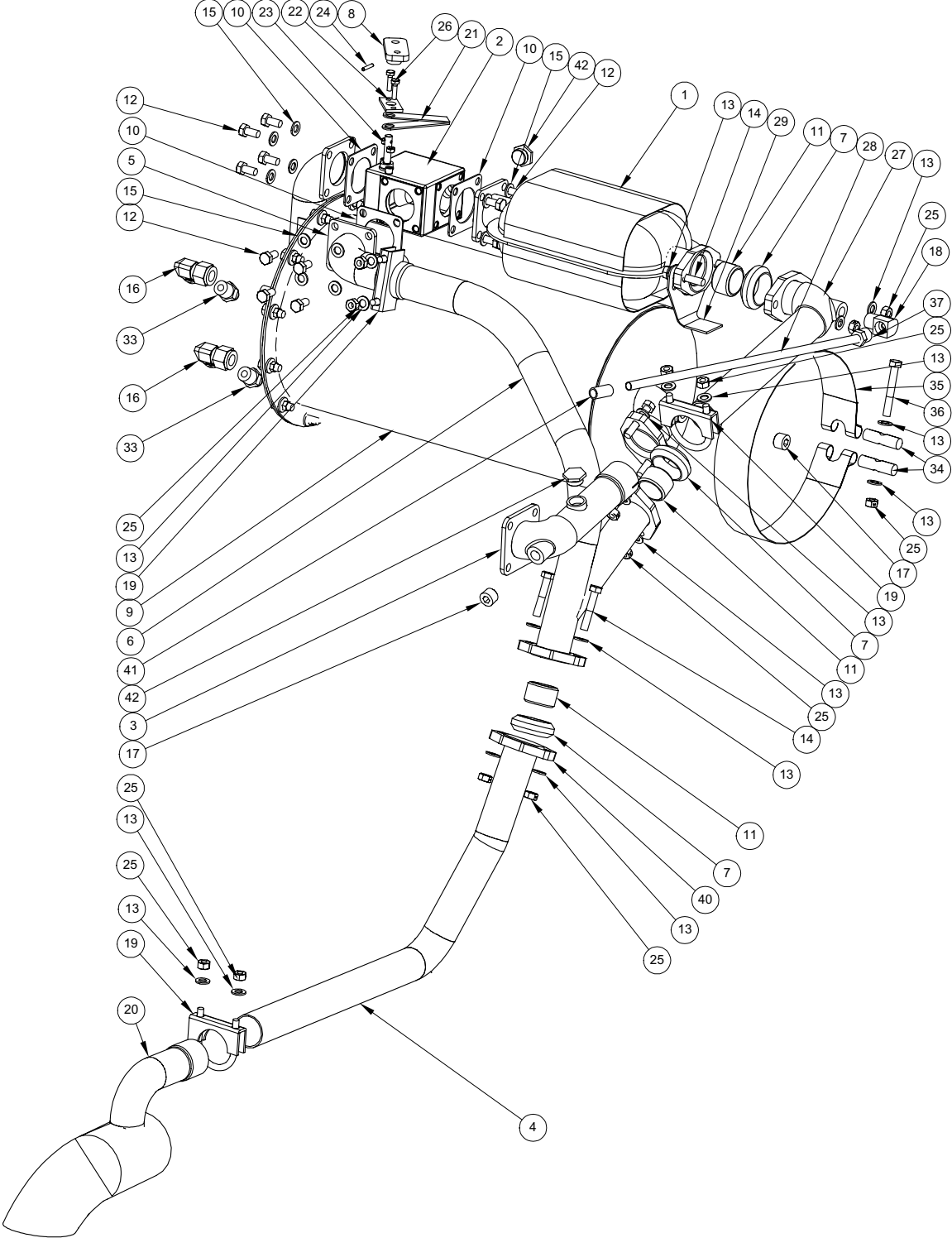
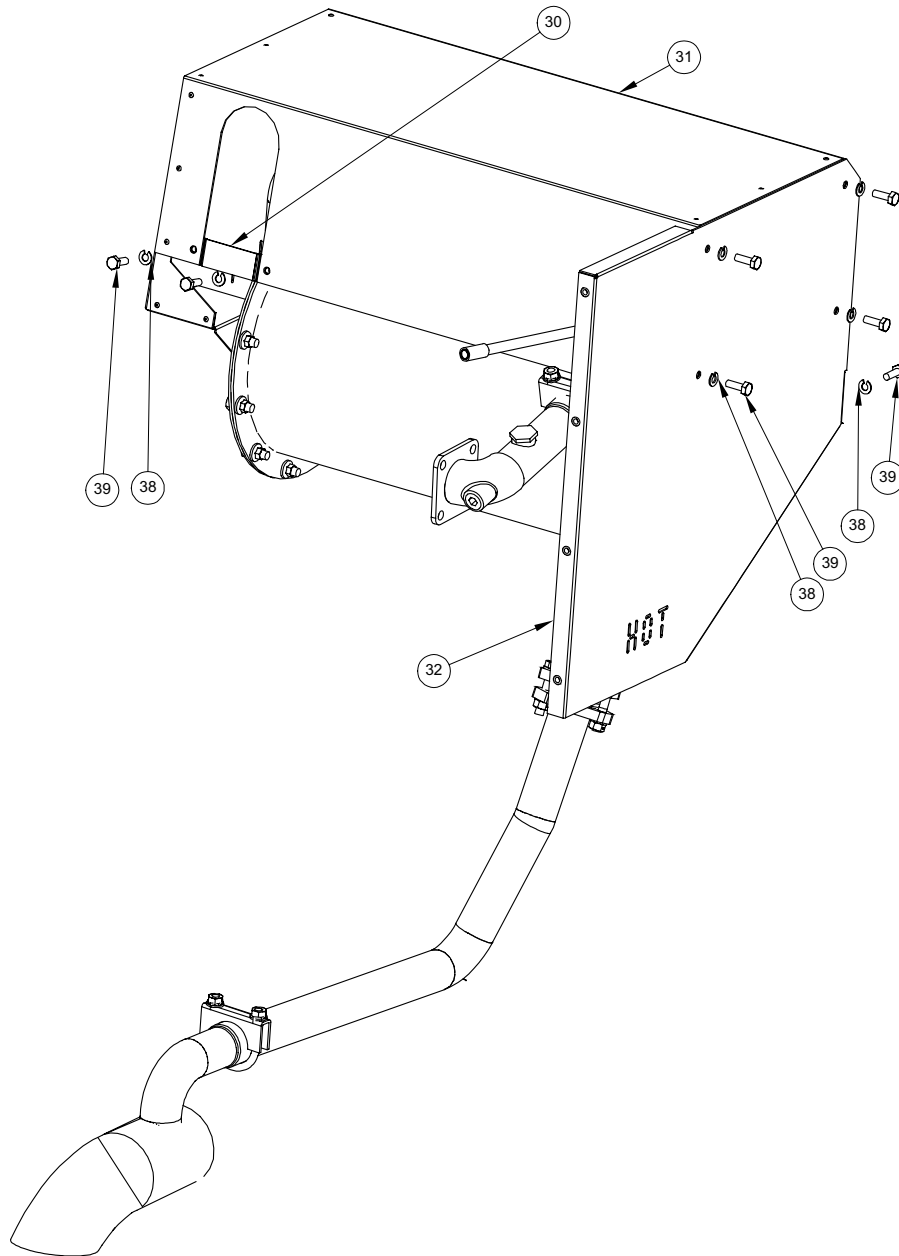


Figure 1-28 Exhaust Assembly - View 2
D-4541 Rev F



Exhaust Assembly Parts List

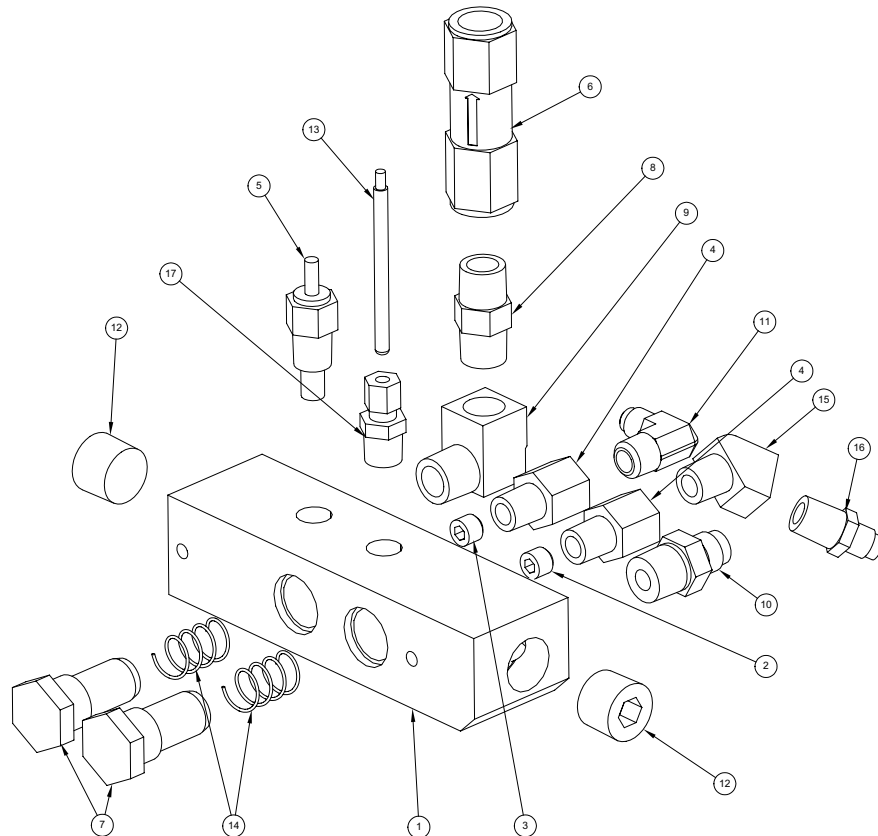
Item	Part Number	Description	Qty
1	000-093-066	Catalytic Converter With Flanges	1
2	000-169-045	Valve, Cast Exhaust Diverter	1
3	000-125-113	Tube, Exhaust To Cat. - Engine Side	1
4	000-125-121	Tube, 1.50 Final Exhaust	1
5	000-052-642	Elbow, 1.50 With Flanges	1
6	000-125-116	Tube, Y Exhaust	1
7	000-057-177	Gasket, Exhaust Donut 1.50"	3
8	000-015-631	Bracket, Air Cylinder Actuation	1
9	000-038-045	Assembly, After Burner Heat Exchanger	1
10	000-057-146	Gasket, Four Hole Exhaust Diverter	3
11	000-125-128	Tube, 1-3/8" OD x 1/8" Wall x 7/8" Long	3
12	000-143-572	Screw, 5/16"-18UNC x 5/8" Lg. Hex Grd. 5	12
13	000-174-049	Washer, 5/16" Flat	20
14	000-143-124	Screw, 5/16"-18UNC x 1.75" Lg. Hex Head	6
15	000-174-069	Washer, 5/16" Inconel Belleville, Diverter Valve	12
16	000-052-600	Elbow, 1/2" Tube x 3/8" FPT	2
17	000-106-008	Plug, 3/8" NPT Allen Head	2
18	000-052-385	Elbow, 3/8" Male Comp. To 3/8" NPT Inverted Flare	1
19	000-033-068	Clamp, 1-1/2" Muffler	3
20	000-001-087	Adapter, Final Exhaust	1
21	000-155-030	Spring, Leaf	1
22	000-138-010	Retainer, Leaf Spring	1
23	000-094-027	Nut, #10-24UNC Hex	2
24	000-103-014	Pin, 1/8 x 3/4" Roll	1
25	000-094-081	Nut, 5/16"-18UNC Hex 2-Way Locking	13
26	000-143-132	Screw, #10-24UNC x 0.75" Lg. Hex Head	2
27	000-125-131	Tube, Exhaust To Cat. - Cat. Side	1
28	000-125-172	Tube, Air Pump - N/S - Maxx 450D/470D	1
29	000-015-725	Bracket, Exhaust Support - Maxx 450D/470D	1
30	000-015-756	Bracket, After Burner & Exhaust Cover	1

Exhaust Assembly Parts List

Item	Part Number	Description	Qty
31	000-041-387	Cover, Exhaust - Maxx 450D/470D	1
32	000-041-390	Cover, Exhaust Side - Maxx 450D/470D	1
33	000-052-507	Nipple, 3/8" NPT x 9/16"-18 37° JIC	2
34	000-141-033	Rod, Heat Exchanger Strap - Retainer	2
35	000-033-122	Clamp, Exhaust Support Mounting - Maxx 450D/470D	1
36	000-143-092	Screw, 5/16"-18UNC x 2.25" Lg. Hex Head	1
37	000-052-711	Bushing, 3/8" Inverted Flair	1
38	000-174-019	Washer, 1/4" Lock	7
39	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	7
40	000-105-181	Flange, Exhaust Donut	1
41	000-125-179	Tube, Air Pump Spacer - Maxx 450/470	1

Figure 1-29 **Hi-PSI Manifold Assembly**

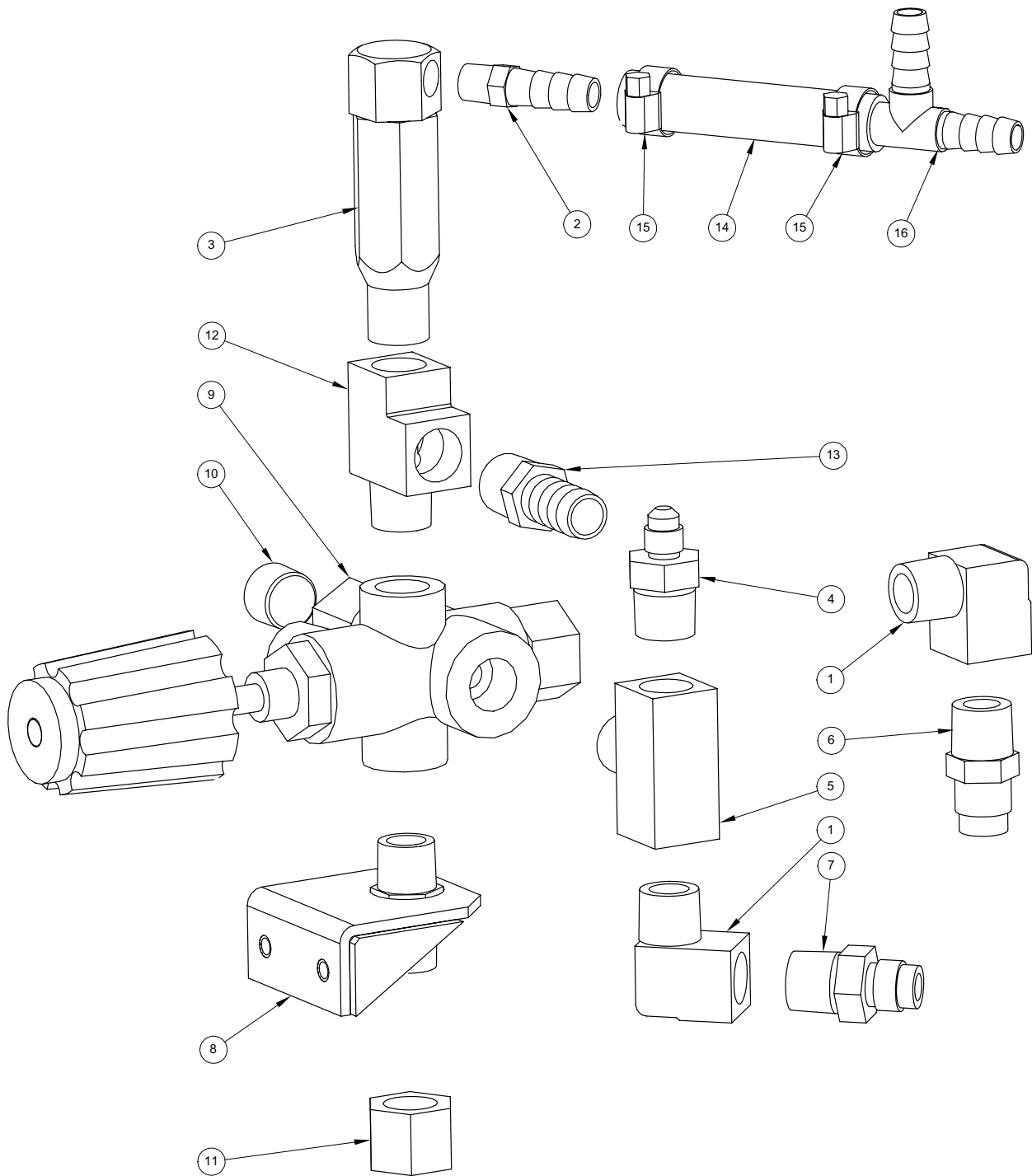
C-4565 Rev E



HI-PSI Manifold Assembly Parts List

Item	Part Number	Description	Qty
1	000-090-010	Manifold, Hi-PSI	1
2	000-180-006	Orifice, Set Screw 0.061"	1
3	000-180-004	Orifice, Set Screw 0.033"	1
4	000-052-423	Bushing, Modified Set Screw Orifice	2
5	000-149-039	Sender, Temperature	1
6	000-169-177	Valve, 3/8" FPT Check 65 PSI	1
7	000-049-016	Filter, 1/4" NPT Replacement "Y"	2
8	000-052-074	Nipple, 3/8" NPT Hex	1
9	000-052-086	Elbow, 3/8" NPT Street	1
10	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	1
11	000-052-532	Elbow, 1/4" SAE x 1/4" JIC x 90°	1
12	000-106-111	Plug, 1/2" NPT Allen	2
13	000-149-540	Sensor, RTD Compression Fitting Style	1
14	000-155-020	Spring, 0.540 O.D. x 0.041 Wire x 1.00 Lg.	2
15	000-052-082	Elbow, 1/4" NPT Street x 45°	1
16	000-052-527	Nipple, 1/4" SAE x 1/4" NPT	1
17	000-052-587	Compression, 3/16" x 1/4" NPT Thermocouple Fitting	1

Figure 1-30 **By-Pass Valve Assembly**
C-4900 Rev D



By-Pass Valve Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-086	Elbow, 3/8" NPT Street	2
2	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	1
3	000-169-027	Valve, Thermal Relief	1
4	000-052-662	Nipple, 3/8" NPT x 1/4" M SAE	1
5	000-052-447	Tee, 3/8" Branch	1
6	000-052-128	Nipple, 3/8" NPT x 3/8" Male Propane	1
7	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	1
8	000-015-515	Bracket, By-Pass Valve Mounting	1
9	000-169-083	Valve, Hi PSI By-Pass - Modified	1
10	000-106-008	Plug, 3/8" NPT Allen Head	1
11	000-027-008	Cap, 3/8" FPT	1
12	000-052-023	Tee, 3/8" NPT Male Street	1
13	000-052-105	Insert, #68 (3/8" NPT x 1/2" Barb)	1
14	000-068-085	Hose, 3/8" High Temp. Black	1
15	000-033-005	Clamp, Size #5 Hose	2
16	000-052-022	Tee, 3/8" Insert	1

Figure 1-31 Maxx 450D Daihatsu Engine Assembly - View 1
D-4351 Rev G

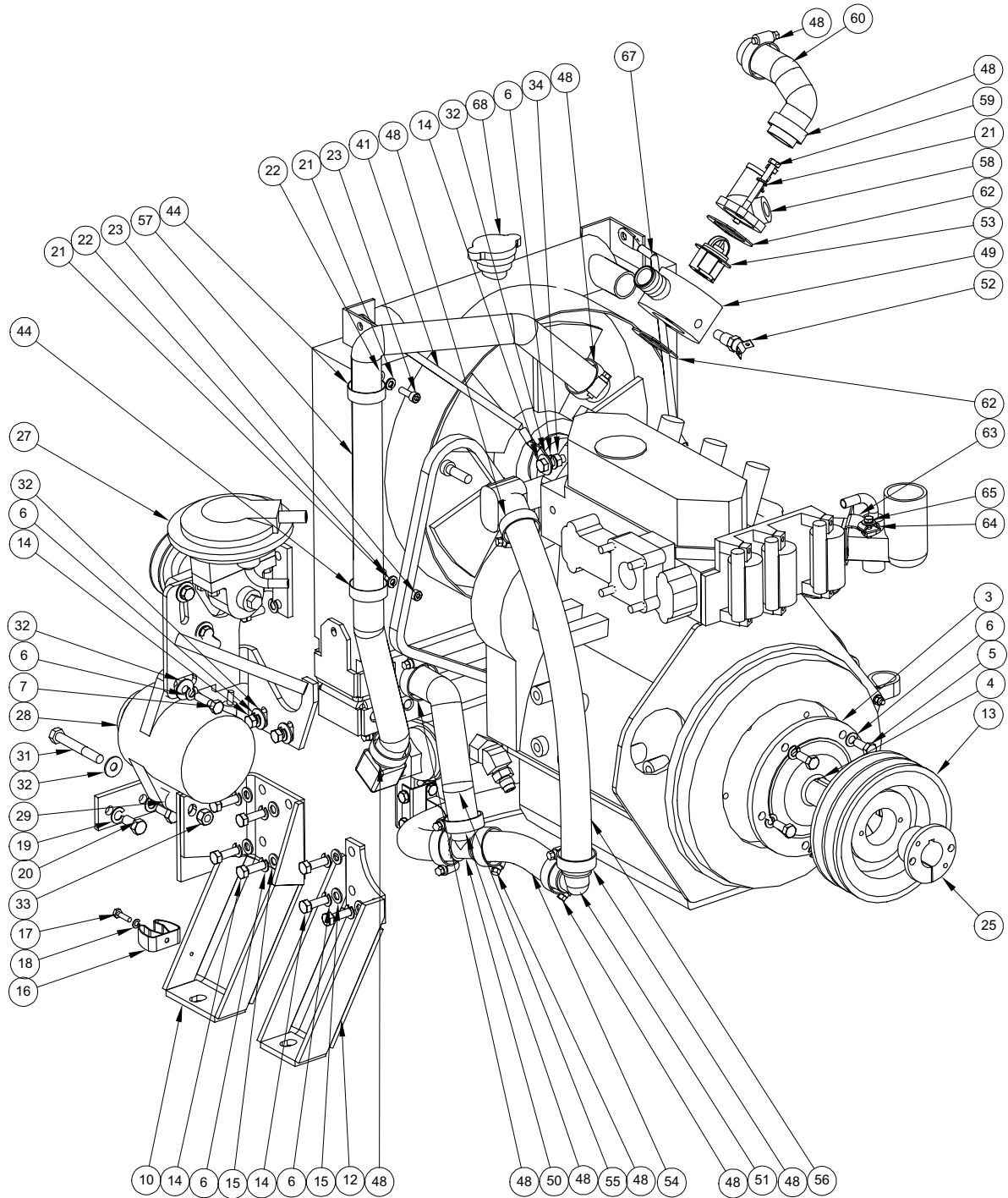
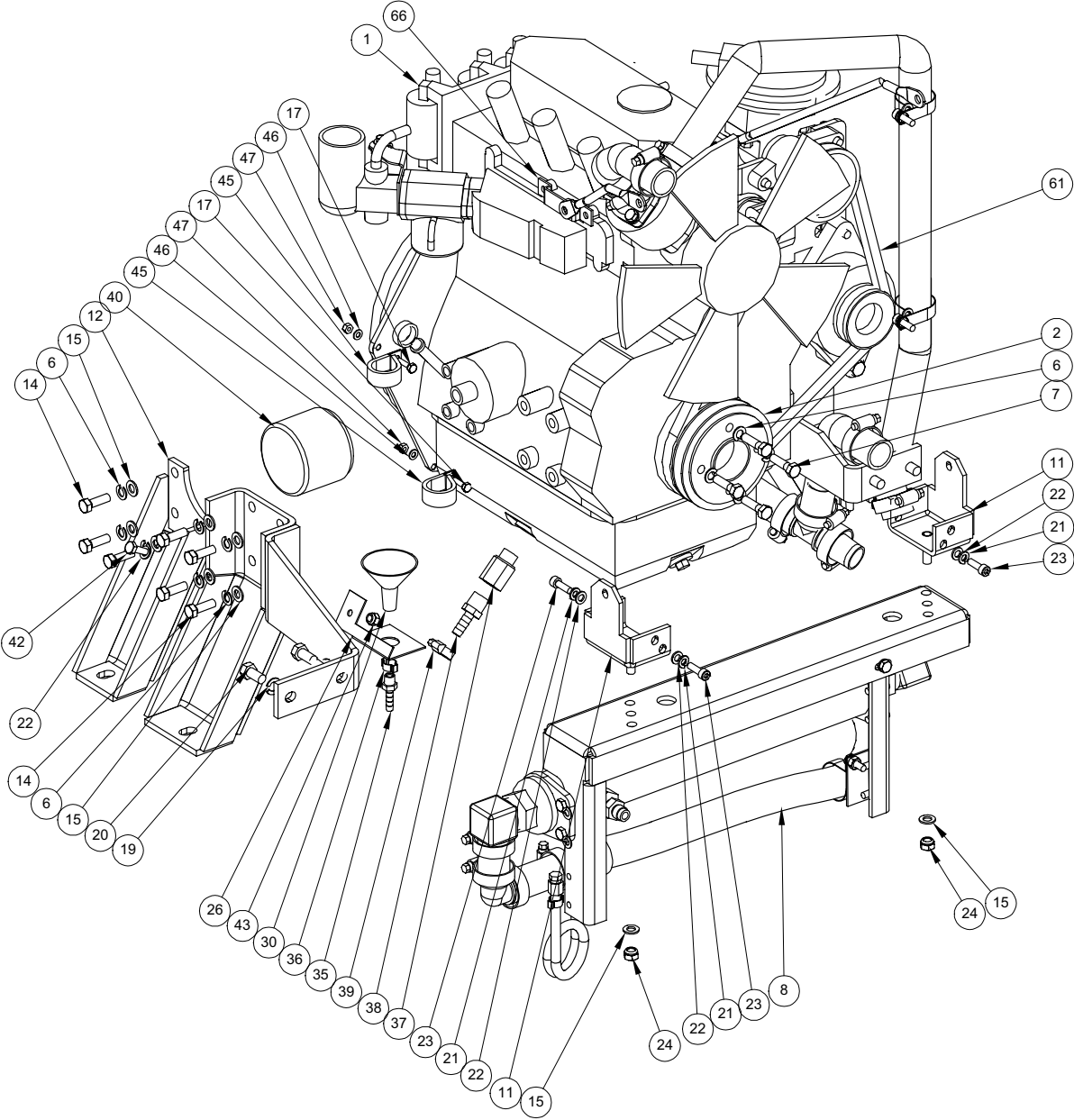


Figure 1-32 Maxx 450D Daihatsu Engine Assembly - View 2
D-4351 Rev G



Maxx 450D Daihatsu Engine Assembly Parts List

Item	Part Number	Description	Qty
1	000-047-016	Engine, Daihatsu 700G	1
2	000-109-078	Pulley, CAT Pump Drive	1
3	000-150-052	Shaft, Daihatsu Stub - Maxx 450D/470D	1
4	000-077-010	Key, 1/4" x 1-1/2" Lg. Class 2 Fit	1
5	000-143-185	Screw, 8mm x 20mm Grade 8.8 Hex Head	6
6	000-174-018	Washer, 5/16" Lock	28
7	000-143-083	Screw, 8mm x 30mm Lg. Grade 8 Hex Head	5
8	Fig. 1-17	Assembly, Water To Water Heat Exchanger - Maxx 450D/47	1
9	000-015-729	Bracket, Left Front Foot - Daihatsu	1
10	000-015-731	Bracket, Right Front Foot - Daihatsu	1
11	000-015-737	Bracket, Radiator Mounting	2
12	000-015-741	Bracket, Rear Foot - Daihatsu	2
13	000-109-100	Pulley, 6" Dual V Belt - Maxx	1
14	000-143-187	Screw, 8mm x 25mm Lg. Grade. 10.9 Hex Head	17
15	000-174-049	Washer, 5/16" Flat	16
16	000-033-066	Clamp, 3/4" Spring	1
17	000-143-132	Screw, #10-24UNC x 0.75" Lg. Hex Head	3
18	000-174-014	Washer, #10 Lock	1
19	000-174-021	Washer, 3/8" Lock	4
20	000-143-017	Screw, 3/8"-16UNC x 0.75" Lg. Hex Head Grd. 8	4
21	000-174-017	Washer, 1/4" Lock	8
22	000-174-003	Washer, 1/4" Flat	7
23	000-143-077	Screw, 6mm x 20mm Lg. Socket Head	6
24	000-094-038	Nut, 5/16"-18UNC Nylock	2
25	000-020-055	Bushing, H 1-1/8, From Solid Steel	1
26	000-015-721	Bracket, Oil Funnel Support	1
27	Fig. 1-20	Air Pump Assembly - N/S - Maxx 450D/470D	1
28	000-004-001	Alternator, Daihatsu 700G & 950G	1
29	000-154-114	Spacer, Alternator Mounting - Maxx 450D/470D	1
30	000-108-100	Guard, Oil Spill - Raw	1

Maxx 450D Daihatsu Engine Assembly Parts List

Item	Part Number	Description	Qty
31	000-143-146	Screw, 3/8-16UNC x 2-3/4" Lg. Hex Head	1
32	000-174-004	Washer, 5/16" Flat	5
33	000-094-100	Nut, 3/8"-16UNC Hex Nylock	1
34	000-094-043	Nut, 8mm Hex	1
35	000-052-097	Insert, #24 (1/8" NPT x 1/4" Barb)	1
36	000-033-017	Clamp, 1/4" I.D. Hose	1
37	000-052-058	Adapter, 3/8" FPT x 16mm Male Engine Oil Drain	1
38	000-052-104	Insert, #66 (3/8" NPT x 3/8" Barb)	1
39	000-033-005	Clamp, Size #5 Hose	1
40	000-049-014	Filter, 16HP Oil - All B & S	1
41	000-015-759	Bracket, Radiator Upper Support - Modified	1
42	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	1
43	000-094-009	Nut, 1/4"-20UNC Hex Nylock	1
44	000-033-116	Clamp, 1-1/2" Cushion Loop w/ 7/16" Mounting Hole	2
45	000-033-057	Clamp, 1" Cushion Loop	2
46	000-174-001	Washer, #10 Flat	2
47	000-094-034	Nut, #10-24UNC Nylock	2
48	000-033-020	Clamp, Size #16 Hose	10
49	000-001-033	Adapter, Thermostat Housing	1
50	000-052-648	Tee, 1" Barb x 1" Barb x 1" Barb	1
51	000-052-091	Elbow, 1" Barb x 1" Barb (For Radiator Hose)	1
52	000-149-505	Sensor, 240°F Daihatsu Engine	1
53	000-149-023	Thermostat, 195°F Engine	1
54	000-068-250	Hose, 1" Green Stripe	1
55	000-068-032	Hose, 1" w/90 Preform Lower Rad. Maxx Units (Raw)	1
56	000-068-250	Hose, 1" Green Stripe	1
57	000-068-250	Hose, 1" Green Stripe	1
58	000-047-016	Thermostat Housing - Daihatsu Engine	1
59	000-143-220	Screw, 6mm x 65mm Lg. Hex Head	2
60	000-068-250	Hose, 1" Green Stripe	1

Maxx 450D Daihatsu Engine Assembly Parts List

Item	Part Number	Description	Qty
61	000-010-110	Belt, XI7390 450D Air Pump	1
62	000-057-050	Gasket, Thermostat Housing Daihatsu Engine	2
63	000-015-782	Bracket, Choke Daihatsu (Manual)	1
64	000-033-124	Clamp, Daihatsu Choke (Manual)	1
65	000-143-551	Screw, Daihatsu Choke (Manual)	1
66	000-015-645	Bracket, Radiator Support Maxx - Block Mount	1
67	000-015-787	Bracket, Maxx Radiator Upper Support - Right - Raw	1
68	000-027-114	Cap, Radiator 3LC Engine - Daihatsu	1

Figure 1-33 Maxx 470D Daihatsu Engine Assembly - View 1
D-4567 Rev H

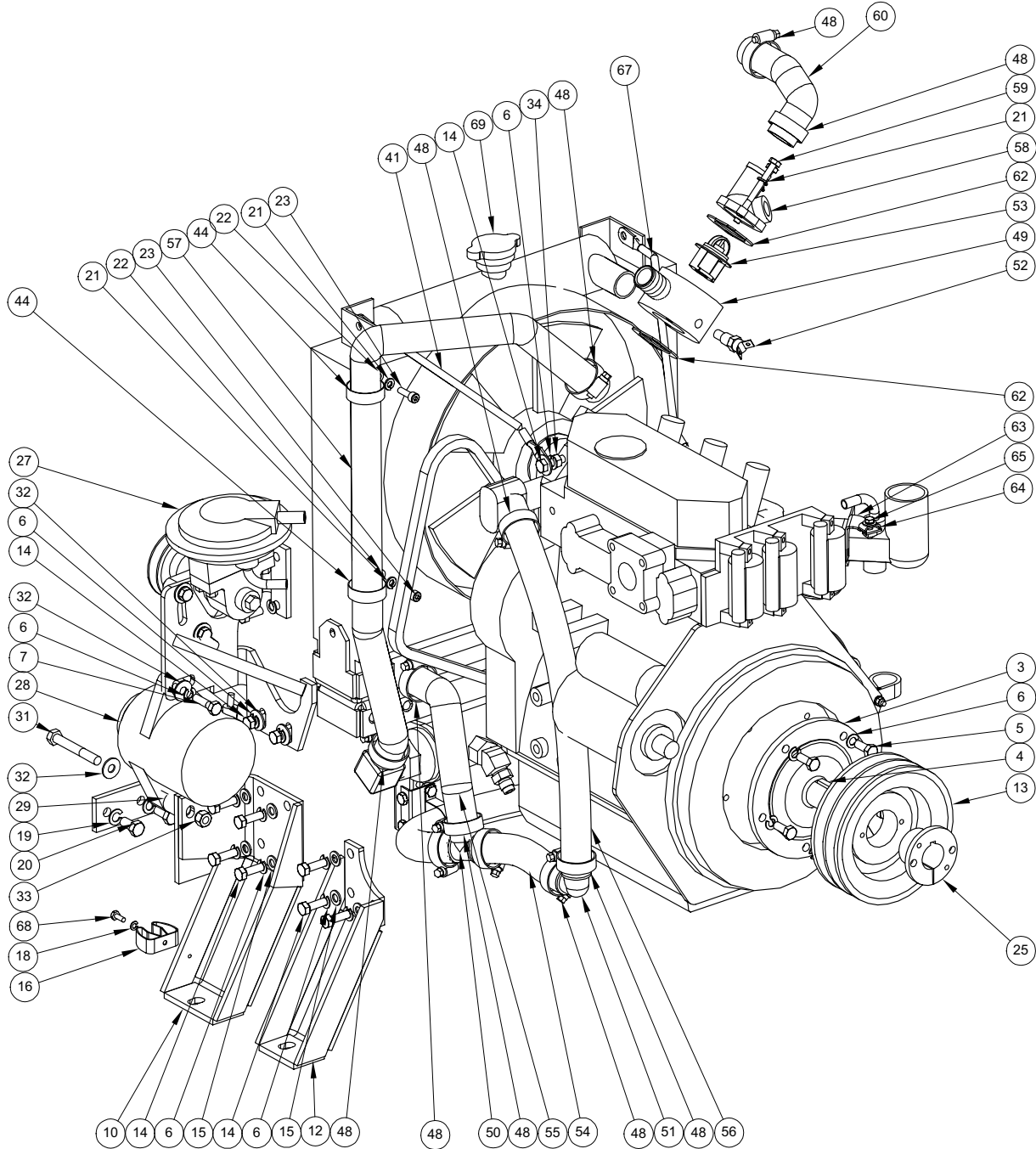
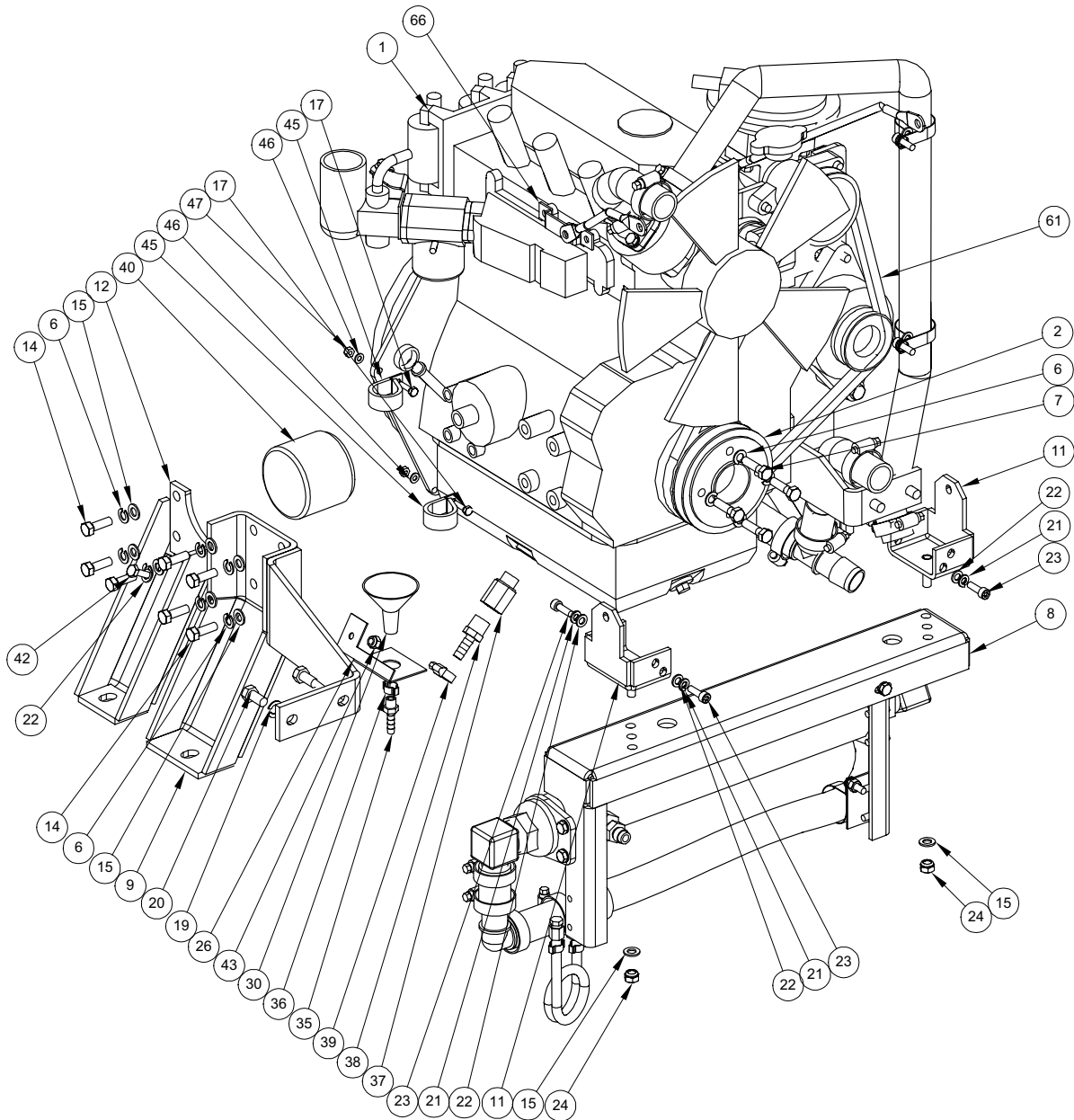


Figure 1-34 Maxx 470D Daihatsu Engine Assembly - View 2
D-4567 Rev H



Maxx 470D Daihatsu Engine Assembly Parts List

Item	Part Number	Description	Qty
1	000-047-019	Engine, Daihatsu 950G	1
2	000-109-078	Pulley, CAT Pump Drive	1
3	000-150-052	Shaft, Daihatsu Stub - Maxx 450D/470D	1
4	000-077-010	Key, 1/4" x 1-1/2" Lg. Class 2 Fit	1
5	000-143-185	Screw, 8mm x 20mm Grade 8.8 Hex Head	6
6	000-174-018	Washer, 5/16" Lock	28
7	000-143-083	Screw, 8mm x 30mm Lg. Grade 8 Hex Head	5
8	Fig. 1-17	Assembly, Water To Water Heat Exchanger - Maxx 450D/47	1
9	000-015-729	Bracket, Left Front Foot - Daihatsu	1
10	000-015-731	Bracket, Right Front Foot - Daihatsu	1
11	000-015-737	Bracket, Radiator Mounting	2
12	000-015-741	Bracket, Rear Foot - Daihatsu	2
13	000-109-100	Pulley, 6" Dual V Belt - Maxx	1
14	000-143-187	Screw, 8mm x 25mm Lg. Grade. 10.9 Hex Head	17
15	000-174-049	Washer, 5/16" Flat	16
16	000-033-066	Clamp, 3/4" Spring	1
17	000-143-132	Screw, #10-24UNC x 0.75" Lg. Hex Head	2
18	000-174-014	Washer, #10 Lock	1
19	000-174-021	Washer, 3/8" Lock	4
20	000-143-017	Screw, 3/8"-16UNC x 0.75" Lg. Hex Head Grd. 8	4
21	000-174-017	Washer, 1/4" Lock	8
22	000-174-003	Washer, 1/4" Flat	7
23	000-143-077	Screw, 6mm x 20mm Lg. Socket Head	6
24	000-094-038	Nut, 5/16"-18UNC Nylock	2
25	000-020-055	Bushing, H 1-1/8, From Solid Steel	1
26	000-015-721	Bracket, Oil Funnel Support	1
27	Fig. 1-20	Air Pump Assembly - N/S - Maxx 450D/470D	1
28	000-004-001	Alternator, Daihatsu 700G & 950G	1
29	000-154-114	Spacer, Alternator Mounting - Maxx 450D/470D	1
30	000-108-100	Guard, Oil Spill - Raw	1

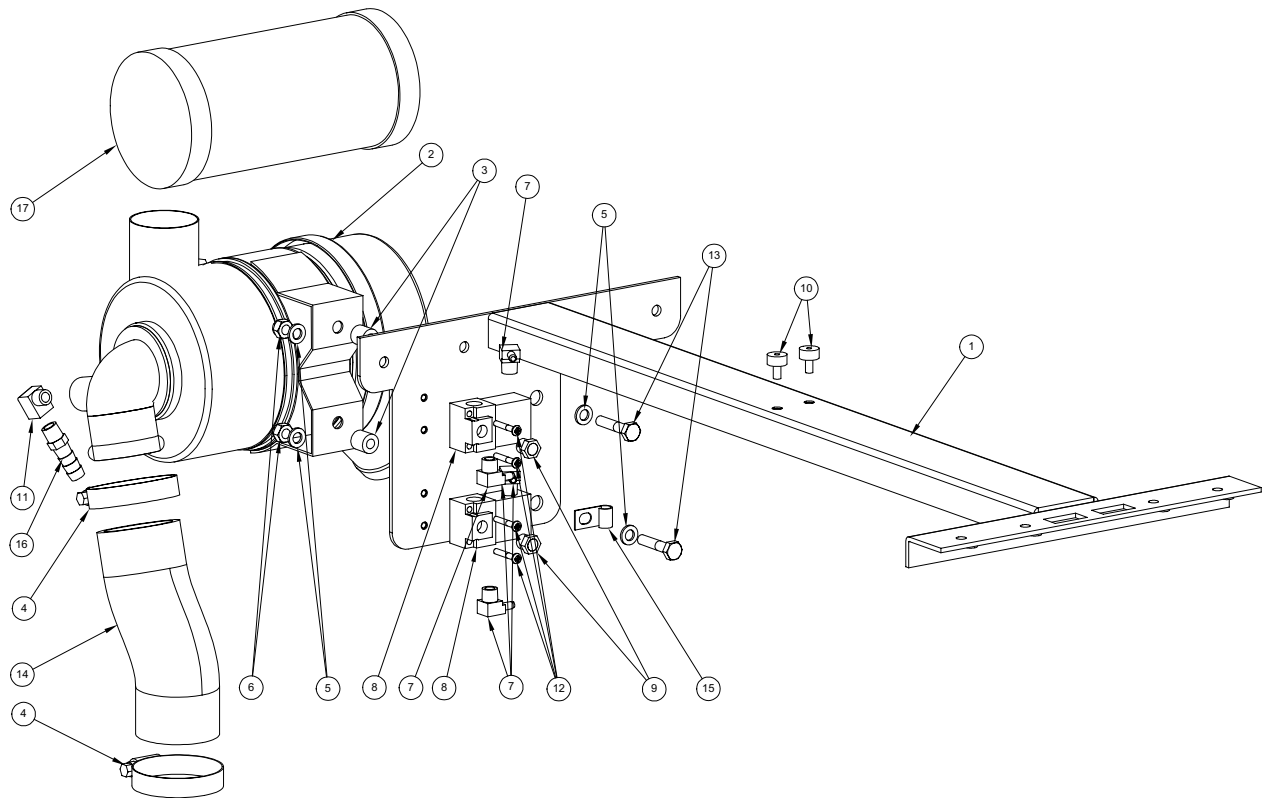
Maxx 470D Daihatsu Engine Assembly Parts List

Item	Part Number	Description	Qty
31	000-143-146	Screw, 3/8-16UNC x 2-3/4" Lg. Hex Head	1
32	000-174-004	Washer, 5/16" Flat	5
33	000-094-100	Nut, 3/8"-16UNC Hex Nylock	1
34	000-094-043	Nut, 8mm Hex	1
35	000-052-097	Insert, #24 (1/8" NPT x 1/4" Barb)	1
36	000-033-017	Clamp, 1/4" I.D. Hose	1
37	000-052-058	Adapter, 3/8" FPT x 16mm Male Engine Oil Drain	1
38	000-052-104	Insert, #66 (3/8" NPT x 3/8" Barb)	1
39	000-033-005	Clamp, Size #5 Hose	1
40	000-049-014	Filter, 16HP Oil - All B & S	1
41	000-015-759	Bracket, Radiator Upper Support - Modified	1
42	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	1
43	000-094-009	Nut, 1/4"-20UNC Hex Nylock	1
44	000-033-116	Clamp, 1-1/2" Cushion Loop w/ 7/16" Mounting Hole	2
45	000-033-057	Clamp, 1" Cushion Loop	2
46	000-174-001	Washer, #10 Flat	2
47	000-094-034	Nut, #10-24UNC Nylock	2
48	000-033-020	Clamp, Size #16 Hose	10
49	000-001-033	Adapter, Thermostat Housing	1
50	000-052-648	Tee, 1" Barb x 1" Barb x 1" Barb	1
51	000-052-091	Elbow, 1" Barb x 1" Barb (For Radiator Hose)	1
52	000-149-505	Sensor, 240°F Daihatsu Engine	1
53	000-149-023	Thermostat, 195°F Engine	1
54	000-068-250	Hose, 1" Green Stripe	1
55	000-068-032	Hose, 1" W/90 Preform Lower Rad. Maxx Units (Raw)	1
56	000-068-250	Hose, 1" Green Stripe	1
57	000-068-250	Hose, 1" Green Stripe	1
58	000-047-016	Thermostat Housing - Daihatsu Engine	1
59	000-143-220	Screw, 6mm x 65mm Lg. Hex Head	2
60	000-068-500	Hose, Upper Radiator Daihatsu Engine	1

Maxx 470D Daihatsu Engine Assembly Parts List

Item	Part Number	Description	Qty
61	000-010-115	Belt, XI7395 470D Air Pump	1
62	000-057-050	Gasket, Thermostat Housing Daihatsu Engine	2
63	000-015-782	Bracket, Choke Daihatsu (Manual)	1
64	000-033-124	Clamp, Daihatsu Choke (Manual)	1
65	000-143-551	Screw, Daihatsu Choke (Manual)	1
66	000-015-645	Bracket, Radiator Support Maxx - Block Mount	1
67	000-015-787	Bracket, Maxx Radiator Upper Support - Right - Raw	1
68	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	1
69	000-027-114	Cap, Radiator 3Lc Engine - Daihatsu	1

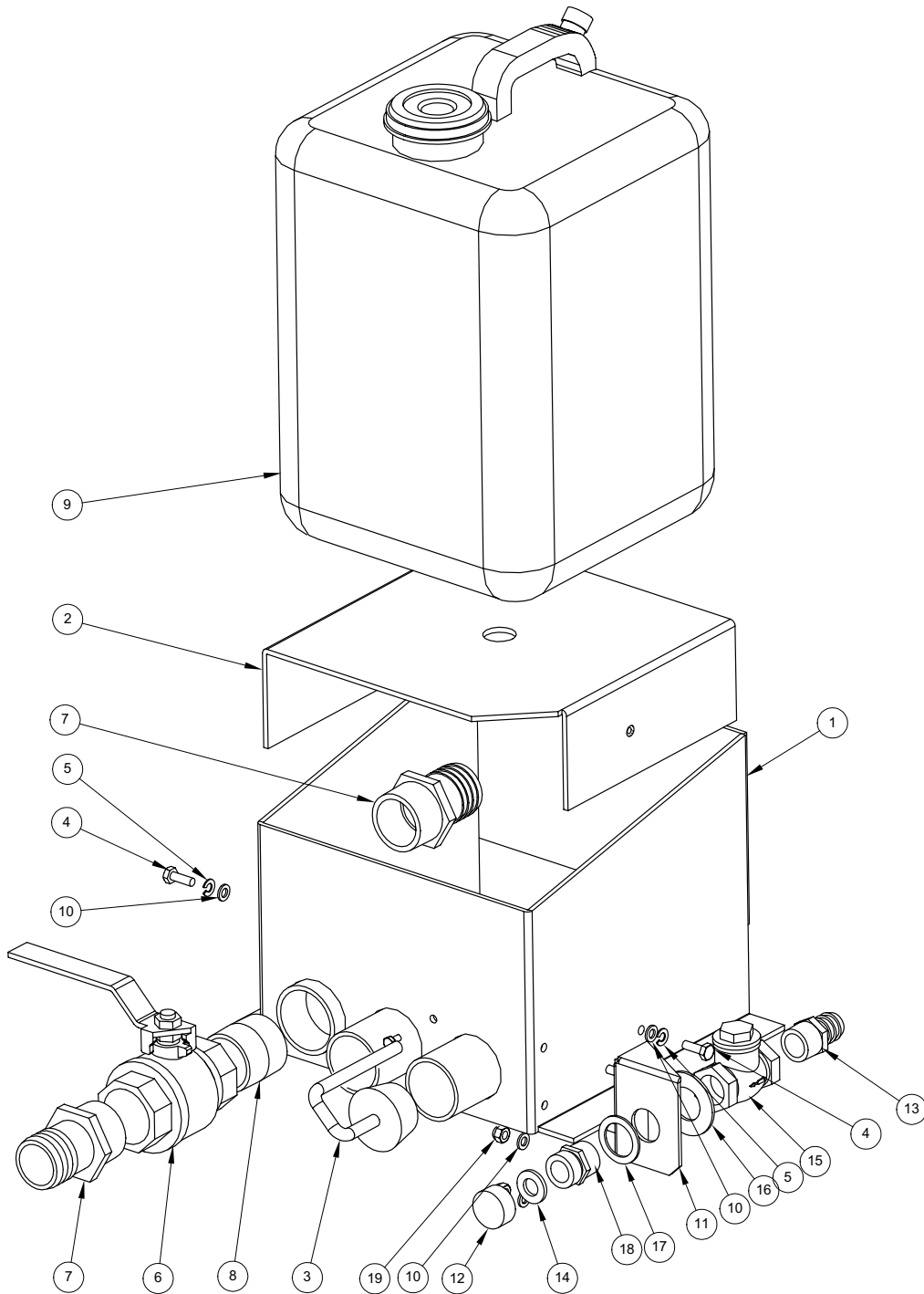
Figure 1-35 Engine Cover Support Assembly
D-5637 Rev A



Engine Cover Support Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-590	Bracket, Engine Cover Support	1
2	000-042-011	Air Cleaner - Daihatsu Engine	1
3	000-154-106	Spacer, 0.25" I.D. x 0.50" Lg.	2
4	000-033-007	Clamp, #28 Hose	2
5	000-174-003	Washer, 1/4" Flat	4
6	000-094-009	Nut, 1/4"-20UNC Hex Nylock	2
7	000-052-106	Insert, 1/8" NPT x 5/32" Barb x 90°	4
8	000-169-070	Valve, Primary Vac. Solenoid	2
9	000-106-014	Plug, Gearbox Vent	2
10	000-108-115	Protector, 5/8" Bumper	2
11	000-052-084	Elbow, 1/8" NPT Street	1
12	000-143-047	Screw, #6-32UNC x 7/8" Lg. Pan Head Phillips	4
13	000-143-003	Screw, 1/4"20UNC x 1.25" Lg. Hex Head	2
14	000-068-733	Hose, Air Filter To Carb - Maxx	1
15	000-033-033	Clamp, 1/4" W. 1/4" Stud	1
16	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	1
17	000-049-063	Filter, Replacement - Engine Air Daihatsu	1

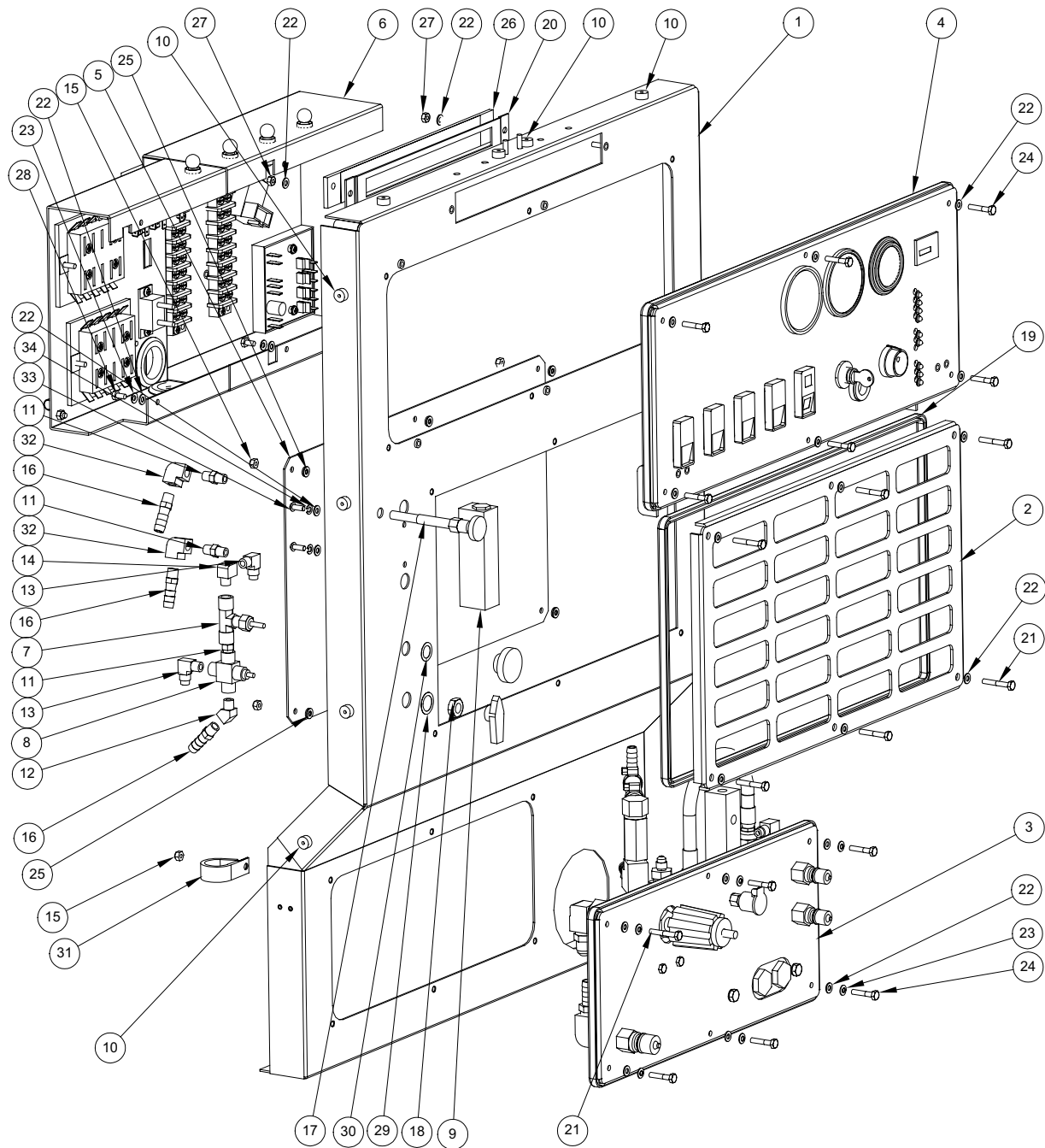
Figure 1-36 Chemical Jug Tray Assembly
C-4945 Rev C



Chemical Jug Tray Assembly Parts List

Item	Part Number	Description	Qty
1	000-166-021	Tray, Chemical Jug - Outer - Weldment	1
2	000-166-025	Tray, Chemical Jug - Inner	1
3	000-078-039	Vacuum Inlet Stopper	1
4	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	2
5	000-174-019	Washer, 1/4" Lock	2
6	000-169-022	Valve, 1-1/2" Full Port Ball	1
7	000-052-226	Insert, 1-1/2" NPT x 1-1/2" Barb (Grey)	2
8	000-052-182	Nipple, 1-1/2" NPT Close Galvanized	1
9	000-159-016	Jug, 5 Gallon Plastic Chemical - Standard	1
10	000-174-003	Washer, 1/4" Flat	4
11	000-015-720	Bracket, Apo Outlet Mounting - Weldment	1
12	000-027-014	Cap, Garden Hose	1
13	000-052-338	Insert, #1212 (3/4" NPT x 3/4" Barb)	1
14	000-057-055	Gasket, Garden Hose	1
15	000-169-009	Valve, 3/4" FPT Swing Check	1
16	000-174-050	Washer, 1" Flat	1
17	000-174-063	Washer, 1.5" O.D. x 1.073" I.D. x 0.075" Thk.	1
18	000-052-281	Nipple, 3/4" NPT x 3/4" Male Garden Hose	1
19	000-094-009	Nut, 1/4"-20UNC Hex Nylock	2

Figure 1-37 Dash Assembly - Maxx 450 Diesel
C-6057 Rev A



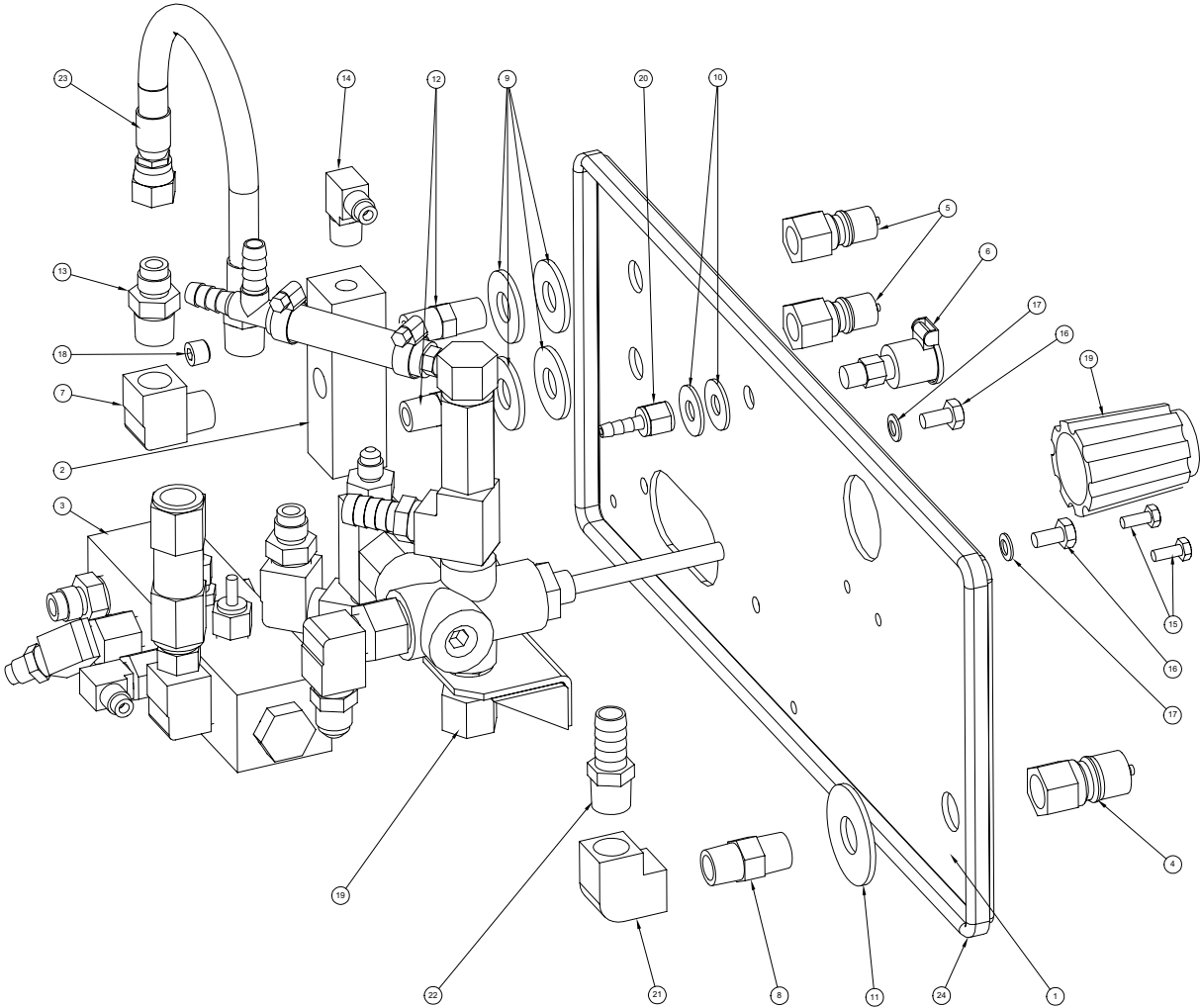
Dash Assembly - Maxx 450 Diesel Parts List

Item	Part Number	Description	Qty
1	000-100-088	Panel, Main Dash - Maxx 450D/470D	1
2	000-100-096	Grill, Upper Dash	1
3	Fig. 1-37	Assembly, Lower Dash Plumbing Connection Panel - Maxx 4	1
4	Fig. 1-14	Assembly, Upper Dash Instrument Panel - Maxx	1
5	000-100-102	Panel, Perforated Grill	1
6	Fig. 1-43	Assembly, Electrical Control Panel - Maxx 450DD	1
7	000-169-160	Valve, Chemical Metering	1
8	000-169-0171	Valve, 3-Way Ball O-Ring Style	1
9	000-074-030	Meter, Chemical Flow Raw	1
10	000-108-115	Protector, 5/8" Bumper	12
11	000-052-069	Nipple, 1/8" NPT Hex	3
12	000-052-078	Elbow, 1/8" NPT x 45° Street	1
13	000-052-531	Elbow, 1/8" NPT x 1/4" SAE	2
14	000-052-084	Elbow, 1/8" NPT Street	1
15	000-094-034	Nut, #10-24UNC Nylock	7
16	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	3
17	000-025-011	Cable, Choke (5 Foot)	1
18	000-094-098	Nut, 7/16"-24UNF - 2 Way Metering Valve	1
19	000-131-131	Trimlok, 3/8" x 1/8"	1
20	000-105-221	Plate, Hydramaster Name - Maxx	1
21	000-143-171	Screw, #10-24UNC x 1.25" Lg. Hex Head	7
22	000-174-001	Washer, #10 Flat	26
23	000-155-054	Spring, #10 Belleville Washer	10
24	000-143-134	Screw, #10-24UNC x 1.00" Lg Hex Head	11
25	000-174-036	Washer, #10 Flat Rubber Backed	6
26	000-084-013	Reflector 1.25" x 12" Transparent	1
27	000-094-004	Nut, #10-24UNC Hex	2
28	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	4
29	000-174-030	Washer, 5/8" I.D. x 7/8" O.D. x 0.010" Thk.	1
30	000-174-062	Washer, 1/2" I.D. x 3/4" O.D. x 0.010" Thk.	1

Dash Assembly - Maxx 450 Diesel Parts List

Item	Part Number	Description	Qty
31	000-033-057	Clamp, 1" Cushion Loop	1
32	000-052-089	Elbow, 1/8" NPT Female	2
33	000-143-328	Screw, #10-32UNF x 1/2" Lg. Phillips Head	2
34	000-174-014	Washer, #10 Lock	2

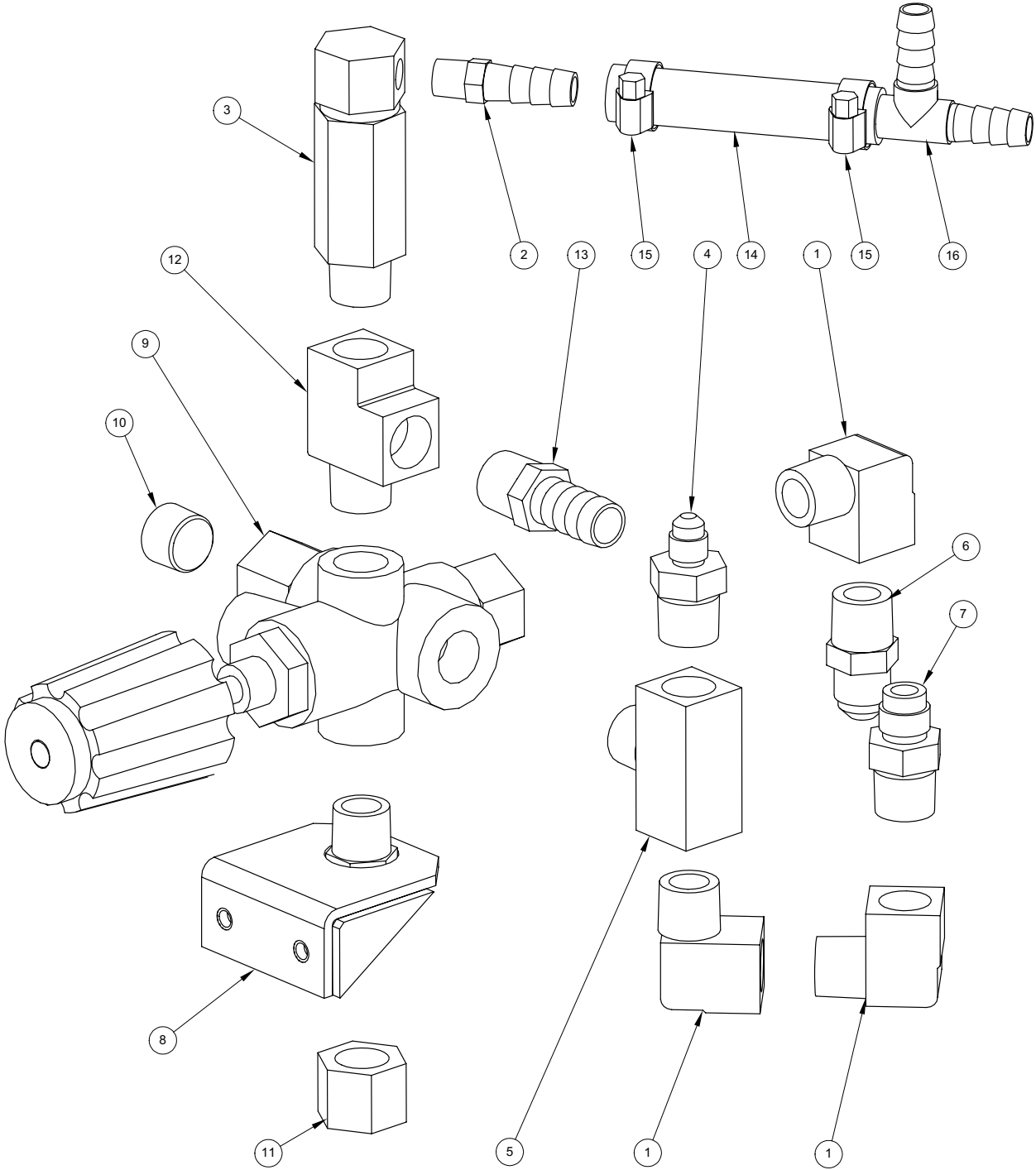
Figure 1-38 Lower Dash Plumbing Connection Panel Assembly - Maxx 450 Diesel
D-5997 Rev -



**Lower Dash Plumbing Connection Panel Assembly
Maxx 450 Diesel Parts List**

Item	Part Number	Description	Qty
1	000-100-094	Panel, Lower Dash Plumbing Connection	1
2	000-090-008	Manifold, Hi Pressure	1
3	Fig. 1-29	Assembly, Hi-PSI Manifold - Maxx 450D/470D	1
4	000-052-052	Quick Connect, 660 Male w/ Viton Standard	1
5	000-052-050	Quick Connect, 440 Male w/ Viton Standard	2
6	000-052-272	Cup, Gravity Feed Oil Blower Lubrication Port	1
7	000-052-086	Elbow, 3/8" NPT Street	1
8	000-052-074	Nipple, 3/8" NPT Hex	1
9	000-174-007	Washer, 1/2" Flat	4
10	000-174-032	Washer, 3/8" Flat	2
11	000-174-008	Washer, 5/8" Flat	1
12	000-052-071	Nipple, 1/4" NPT Hex	2
13	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	1
14	000-052-532	Elbow, 1/4" SAE x 1/4" JIC x 90°	1
15	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	2
16	000-143-542	Screw, 1/4"-28UNF x 0.50" Lg.	2
17	000-155-053	Spring, 1/4" Belleville Washer	2
18	000-106-009	Plug, 1/8" NPT Allen Head	1
19	Fig. 1-39	Assembly, By-Pass Valve	1
20	000-052-096	Insert, #F23 (1/8" FPT x 3/16" Barb)	1
21	000-052-142	Elbow, 3/8" FPT x FPT	1
22	000-052-105	Insert, #68 (3/8" NPT x 1/2" Barb)	1
23	000-068-513	Hose, 3/8" x 10" Teflon w/ F JIC End & 3/8" NPT	1
24	000-131-131	Trimlok, 3/8" x 1/8"	1

Figure 1-39 By-Pass Valve Assembly - Maxx 450 Diesel
C-5996 Rev -



By-Pass Valve Assembly - Maxx 450 Diesel Parts List

Item	Part Number	Description	Qty
1	000-052-086	Elbow, 3/8" NPT Street	3
2	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	1
3	000-169-011	Valve, Hi Temp Control 180°	1
4	000-052-662	Nipple, 3/8" NPT x 1/4" M SAE	1
5	000-052-447	Tee, 3/8" Branch	1
6	000-052-128	Nipple, 3/8" NPT x 3/8" Male Propane	1
7	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	1
8	000-015-515	Bracket, By-Pass Valve Mounting	1
9	000-169-083	Valve, Hi PSI By-Pass - Modified	1
10	000-106-008	Plug, 3/8" NPT Allen Head	1
11	000-027-008	Cap, 3/8" FPT	1
12	000-052-023	Tee, 3/8" NPT Male Street	1
13	000-052-105	Insert, #68 (3/8" NPT x 1/2" Barb)	1
14	000-068-085	Hose, 3/8" High Temp. Black	1
15	000-033-005	Clamp, Size #5 Hose	2
16	000-052-022	Tee, 3/8" Insert	1

Figure 1-40 Daihatsu Engine Assembly - Maxx 450 Diesel - View 1
D-6056 Rev A

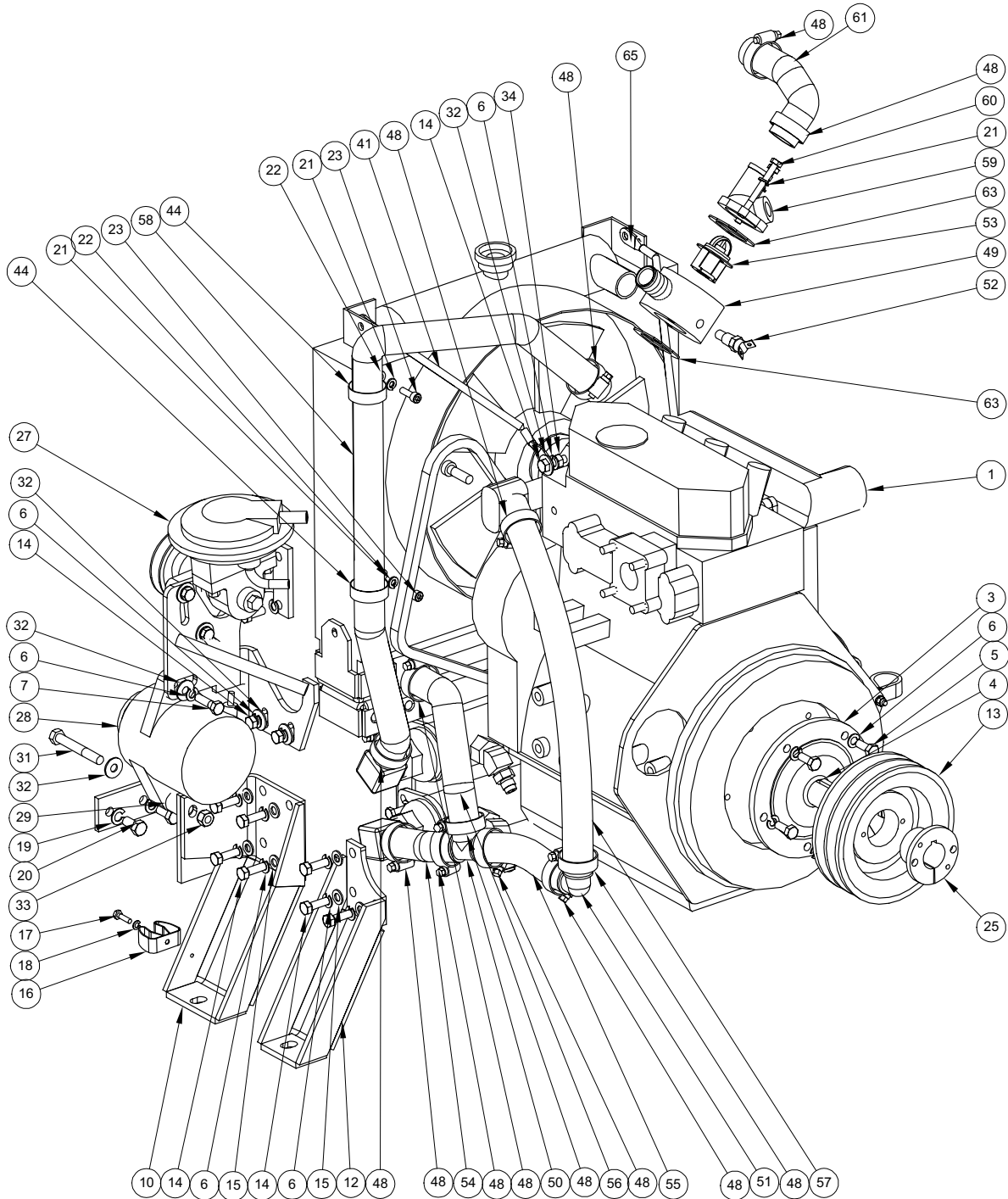
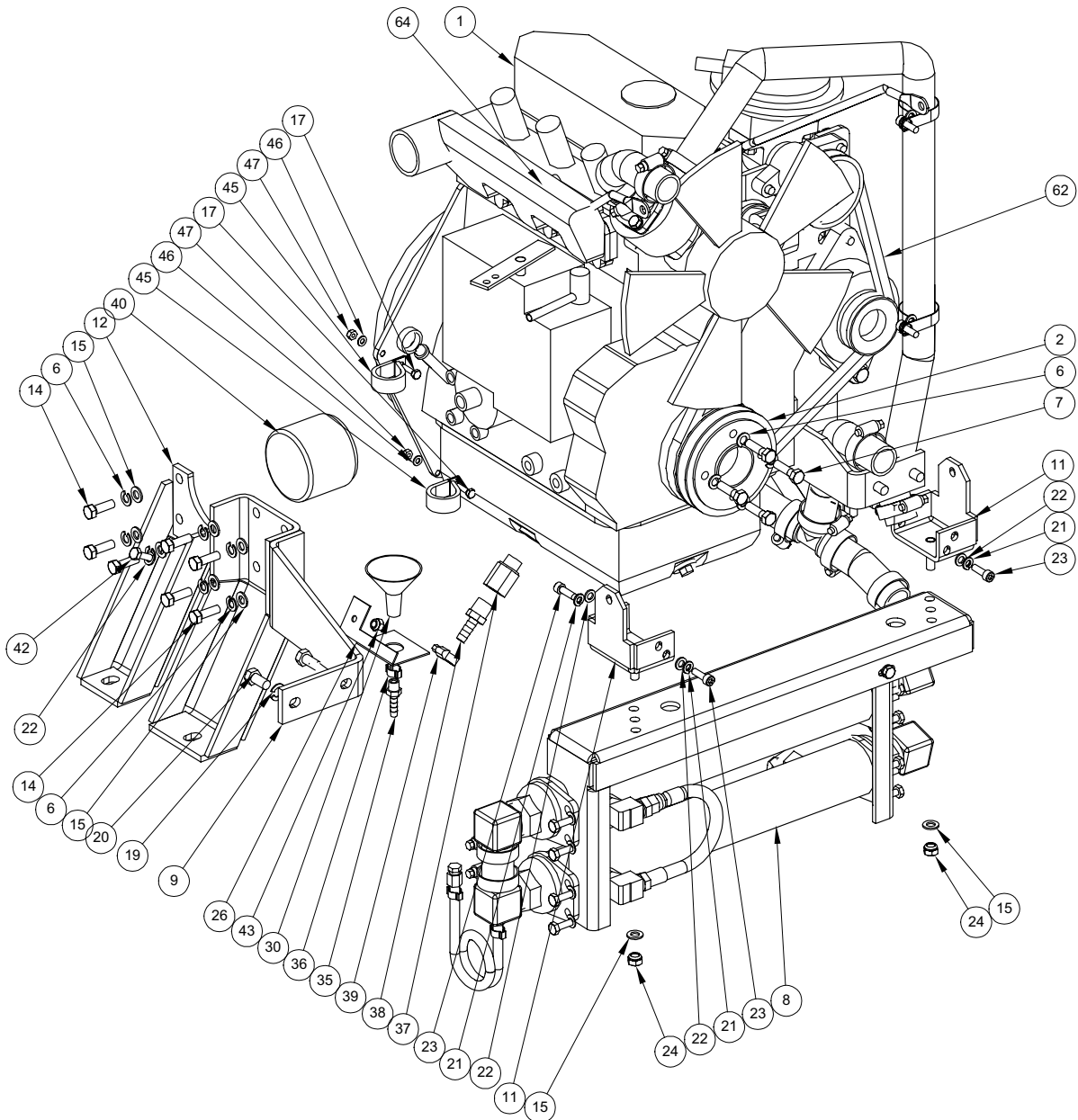


Figure 1-41 Daihatsu Engine Assembly - Maxx 450 Diesel - View 2
D-6056 Rev A



Daihatsu Engine Assembly - Maxx 450 Diesel Parts List

Item	Part Number	Description	Qty
1	000-047-017	Engine, Daihatsu 850 Diesel	1
2	000-109-078	Pulley, CAT Pump Drive	1
3	000-150-052	Shaft, Daihatsu Stub - Maxx 450D/470D	1
4	000-077-010	Key, 1/4" x 1-1/2" Lg. Class 2 Fit	1
5	000-143-185	Screw, 8mm x 20mm Grade 8.8 Hex Head	6
6	000-174-018	Washer, 5/16" Lock	28
7	000-143-083	Screw, 8mm x 30mm Lg. Grade 8 Hex Head	5
8	Fig. 1-42	Assembly, Water To Water Heat Exchanger	1
9	000-015-729	Bracket, Left Front Foot - Daihatsu	1
10	000-015-731	Bracket, Right Front Foot - Daihatsu	1
11	000-015-737	Bracket, Radiator Mounting	2
12	000-015-741	Bracket, Rear Foot - Daihatsu	2
13	000-109-100	Pulley, 6" Dual V Belt - Maxx	1
14	000-143-187	Screw, 8mm x 25mm Lg. Grade. 10.9 Hex Head	17
15	000-174-049	Washer, 5/16" Flat	16
16	000-033-066	Clamp, 3/4" Spring	1
17	000-143-132	Screw, #10-24UNC x 0.75" Lg. Hex Head	3
18	000-174-014	Washer, #10 Lock	1
19	000-174-021	Washer, 3/8" Lock	4
20	000-143-017	Screw, 3/8"-16UNC x 0.75" Lg. Hex Head Grd. 8	4
21	000-174-017	Washer, 1/4" Lock	8
22	000-174-003	Washer, 1/4" Flat	7
23	000-143-077	Screw, 6mm x 20mm Lg. Socket Head	6
24	000-094-038	Nut, 5/16"-18UNC Nylock	2
25	000-020-055	Bushing, H 1-1/8, From Solid Steel	1
26	000-015-721	Bracket, Oil Funnel Support	1
27	Fig. 1-20	Air Pump Assembly - N/S - Maxx 450D/470D	1
28	000-004-001	Alternator, Daihatsu 700G & 950G	1
29	000-154-114	Spacer, Alternator Mounting - Maxx 450D/470D	1
30	000-108-100	Guard, Oil Spill - Raw	1

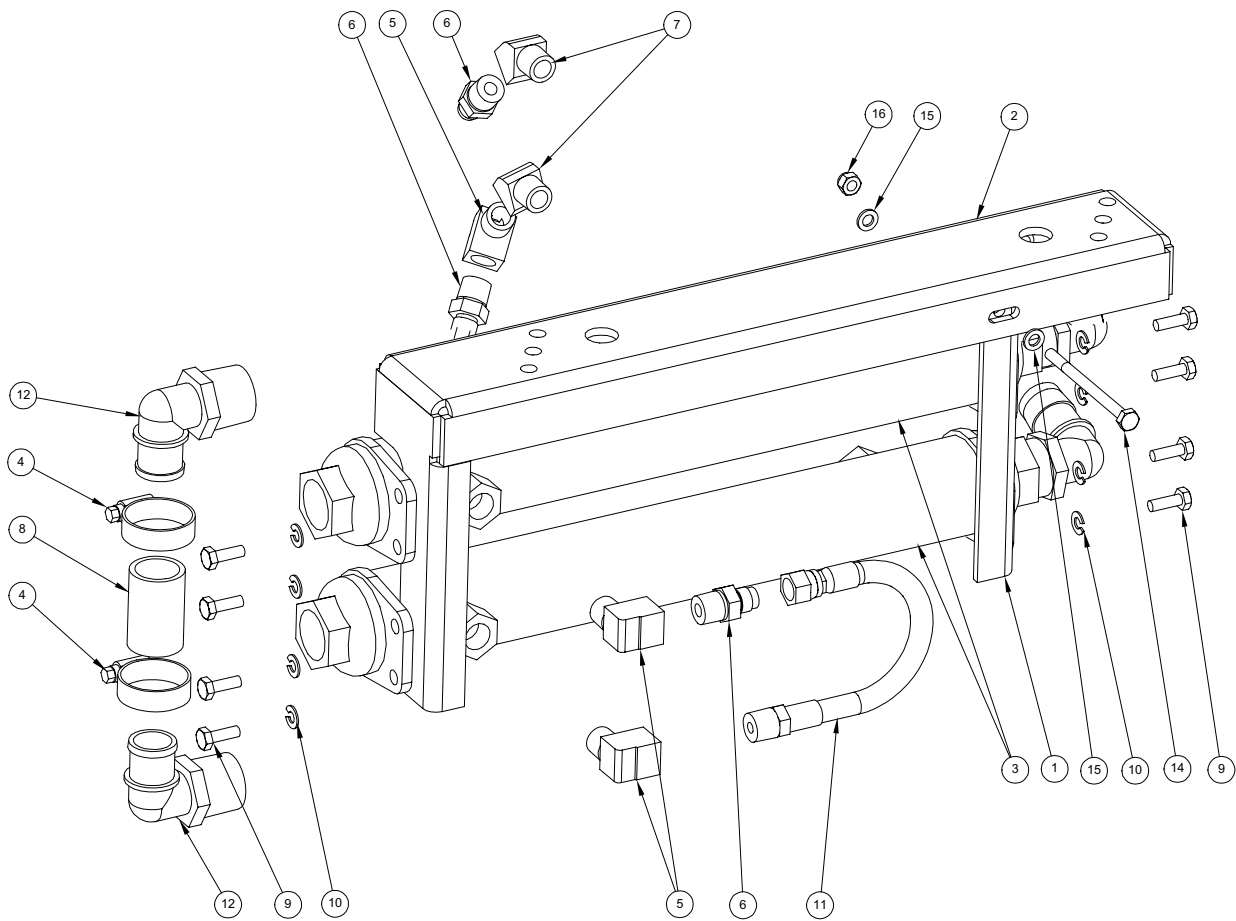
Daihatsu Engine Assembly - Maxx 450 Diesel Parts List

Item	Part Number	Description	Qty
31	000-143-146	Screw, 3/8-16UNC x 2-3/4" Lg. Hex Head	1
32	000-174-004	Washer, 5/16" Flat	5
33	000-094-100	Nut, 3/8"-16UNC Hex Nylock	1
34	000-094-043	Nut, 8mm Hex	1
35	000-052-097	Insert, #24 (1/8" NPT x 1/4" Barb)	1
36	000-033-017	Clamp, 1/4" I.D. Hose	1
37	000-052-058	Adapter, 3/8" FPT x 16mm Male Engine Oil Drain	1
38	000-052-104	Insert, #66 (3/8" NPT x 3/8" Barb)	1
39	000-033-005	Clamp, Size #5 Hose	1
40	000-049-014	Filter, 16HP Oil - All B & S	1
41	000-015-759	Bracket, Radiator Upper Support - Modified	1
42	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	1
43	000-094-009	Nut, 1/4"-20UNC Hex Nylock	1
44	000-033-116	Clamp, 1-1/2" Cushion Loop w/ 7/16" Mounting Hole	2
45	000-033-057	Clamp, 1" Cushion Loop	2
46	000-174-001	Washer, #10 Flat	2
47	000-094-034	Nut, #10-24UNC Nylock	2
48	000-033-020	Clamp, Size #16 Hose	12
49	000-001-033	Adapter, Thermostat Housing	1
50	000-052-648	Tee, 1" Barb x 1" Barb x 1" Barb	1
51	000-052-091	Elbow, 1" Barb x 1" Barb (For Radiator Hose)	1
52	000-149-505	Sensor, 240°F Daihatsu Engine	1
53	000-149-023	Thermostat, 195°F Engine	1
54	000-068-250	Hose, 1" Green Stripe	1
55	000-068-250	Hose, 1" Green Stripe	1
56	000-068-032	Hose, 1" W/90 Preform Lower Rad. Maxx Units (Raw)	1
57	000-068-250	Hose, 1" Green Stripe	1
58	000-068-250	Hose, 1" Green Stripe	1
59	000-047-016	Thermostat Housing - Daihatsu Engine	1
60	000-143-220	Screw, 6mm x 65mm Lg. Hex Head	2

Daihatsu Engine Assembly - Maxx 450 Diesel Parts List

Item	Part Number	Description	Qty
61	000-068-250	Hose, 1" Green Stripe	1
62	000-010-115	Belt, XI7395 470D Air Pump	1
63	000-057-050	Gasket, Thermostat Housing Daihatsu Engine	2
64	000-015-645	Bracket, Radiator Support Maxx - Block Mount	1
65	000-015-787	Bracket, Maxx Radiator Upper Support - Right - Raw	1

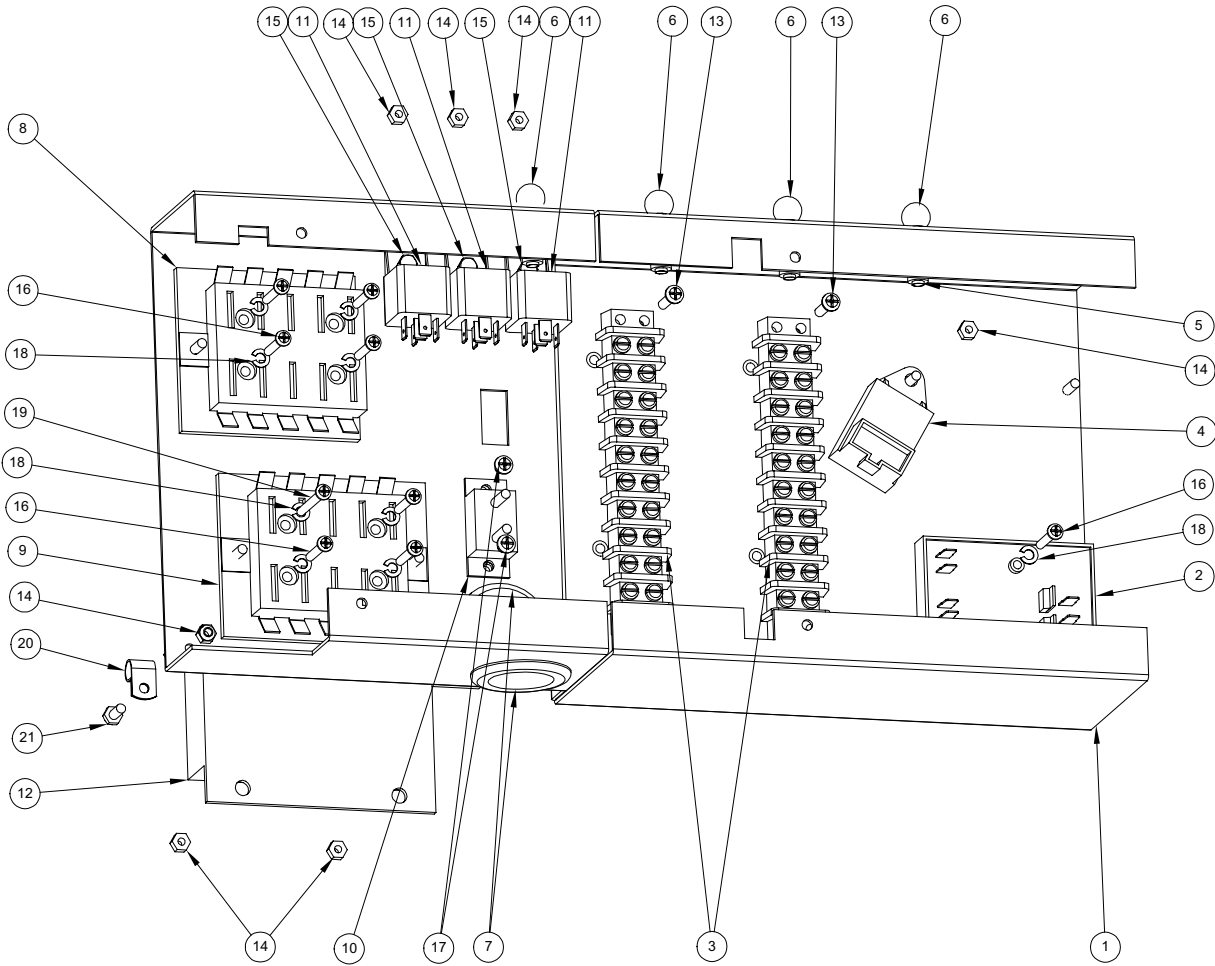
Figure 1-42 Water To Water HX Assembly - Maxx 450 Diesel
D-4353 Rev F



Water To Water HX Assembly - Maxx 450 Diesel Parts List

Item	Part Number	Description	Qty
1	000-015-739	Bracket, Dual HX Mounting - Right	1
2	000-015-735	Bracket, Dual HX Mounting Channel	1
3	000-038-043	Heat Exchanger, Water To Water	2
4	000-033-020	Clamp, Size #16 Hose	2
5	000-052-086	Elbow, 3/8" NPT Street	3
6	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	3
7	000-052-083	Elbow, 3/8" NPT Street x 45°	2
8	000-068-250	Hose, 1" Green Stripe - Bulk	1
9	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	8
10	000-174-019	Washer, 1/4" Lock	8
11	000-068-513	Hose Assembly, 3/8" x 10" Teflon	1
12	000-052-131-1	Elbow, 1" NPT - Modified	2
13	000-052-131	Elbow, 1"Nptx1"Barb(Glass Filled Black Nylon)	2
14	000-143-181	Screw, 1/4"-20UNC x 3.50" Lg.	1
15	000-174-003	Washer, 1/4" Flat	2
16	000-094-009	Nut, 1/4"-20UNC Hex Nylock	1

Figure 1-43 Control Panel - Maxx 450 Diesel
D-6089 Rev -



Control Panel Assembly - Maxx 450 Diesel Parts List

Item	Part Number	Description	Qty
1	000-100-100	Panel, Control Mount	1
2	000-074-110	Controller, Temp. Analog	1
3	000-012-010	Block, Terminal 10 Post	2
4	- - -	Timer, Glow Plug - Daihatsu 850D (Comes w/ Engine)	1
5	000-084-009	Lamp, Socket - Dashboard	4
6	000-084-004	Lamp, Replacement Gauge	4
7	000-060-010	Grommet, 1-5/16" I.D.	2
8	000-056-020	Fuse Panel	1
9	000-056-030	Diode Panel	1
10	000-018-040	Circuit Breaker, 50 AMP	1
11	000-157-022	Switch, Relay	3
12	000-029-016	Governor, Hall Affects Maxx 450D/470DD	1
13	000-143-062	Screw, #10-24UNC x 0.75" Lg. Pan Head Phillips	4
14	000-094-034	Nut, #10-24UNC Nylock	9
15	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	3
16	000-143-545	Screw, #8-32UNC x 1.00" Lg. Phillips Head	9
17	000-143-533	Screw, #10-24UNC x 0.25" Lg. Pan Head Phillips	2
18	000-174-014	Washer, #10 Lock	10
19	000-143-298	Screw, #8-32UNC x 1.50" Lg. Pan Head Phillips	1
20	000-033-044	Clamp, 3/8" Tube	1
21	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	1

Maxx 450D/470/Diesel Hose Assemblies

Hose Part No.	Hose Descript.	From	To	Qty
068-015	1/4"	Water to Water Heat Exchanger (169-081)		12 in
068-020		Maxx Hi Temp Valve (169-050)	Recovery Tank	47 in
068-030	5/32"	APO (111-012)	Hard Water MagnaClean (163-056)	30 in
		Upr. Primary Vac. Solenoid Valve (169-070)	Air Cylinder Valve (169-169)	12 in
		Lwr. Primary Vac. Solenoid Valve (169-070)	Air Cylinder Valve (169-169)	8 1/2" in
		Upr. Primary Vac. Solenoid Valve (169-070)	3/16" Plastic Vac Tee (052-155)	4 in
		Lwr. Primary Vac. Solenoid Valve (169-070)	3/16" Plastic Vac Tee (052-155)	2 in
		3/16" Plastic Vac Tee (052-155)	3/16" Plastic Vac Tee (052-155)	4 in
		3/16" Plastic Vac Tee (052-155)	Diverter Control Check Valve (169-156) (Eng. Side)	1 1/2 in
		3/16" Plastic Vac Tee (052-155)	Upr. Primary Vac. Solenoid Valve (169-156) (Blower Side)	1 1/2 in
		Diverter Control Check Valve (169-156)	Engine	3 in
		Diverter Control Check Valve (169-156)	CDS 4.8 Blower Adapter (001-041)	80 in
		Gravity Feed Oil Cup (052-272)	Blower Adapter (001-041)	49 in
		0-30" Hg Vac. Gauge (074-017)	Blower Adapter (001-041)	80 in
068-032	Pre-formed	Water to Water Heat Exchanger (038-043)	1" Barb x 1" Barb Tee (052-648)	5 in
		Radiator w/ 90°	1" Barb x 1" Barb Tee (052-648)	8 in

Maxx 450D/470/Diesel Hose Assemblies

Hose Part No.	Hose Descript.	From	To	Qty
068-085		Cat Pump Oil Drain	Frame	17 in
		Modified Chemical Meter (078-032)	Chemical Last-Step Pump (111-035)	33 in
		Air Filter	Air Pump	22 in
068-086		Cat Pump Fill		16 in
		Air Pump (111-085)	Air Pump Hose Adapter	8 in
		4" x 19" Tube & Shell Heat Ex. Core (038-031)	Hi PSI Bypass Valve (169-081)	14"
		Poly Water Box Tank (159-105)	4" x 19" Tube & Shell Heat Ex. Core (038-031)	29 in
068-103		MagnaClean (163-056)	Poly Water Box Tank (159-105)	10 in
068-230		Fuel Line		8 ft
068-250		Water to Water Heat Exchanger (038-043)	Water to Water Heat Exchanger (038-043)	2 in
		1" Barb x 1" Barb x 1" Barb Tee (052-648)	1" Barb x 1" Barb Elbow for Radiator Hose (052-091)	7 in
		Radiator	1" Barb x 1" Barb Elbow (052-091)	18 in
		Thermostat Adapter (001-033)	Water to Water Hear Exchanger (038-043)	32 in
068-326		Chemical Jug Pick-up	Modified Chemical Meter (074-032)	63 in
068-236		Chemical Jug Return	3-Way Chemical Valve (169-017)	58 in
		Fuel Line w/Female Quick Connect (450 Diesel)		10 ft
068-092		Hi PSI Brass Manifold (Out) (090-008)	Hi PSI Brass Manifold (090-010)/ 3/8 Check Valve Brass (169-175)	
068-511		Hi PSI Brass Manifold (090-010)	After Burner Heat Exchanger (Out) (038-045)	

Maxx 450D/470/Diesel Hose Assemblies

Hose Part No.	Hose Description	From	To	Qty
068-512		Water to Water Heat Exchanger (038-043)	Hi PSI Bypass Valve (169-081)	
068-513		Water to Water Heat Exchanger (038-043)	Water to Water Heat Exchanger (038-043)	
068-514		Hi PSI Brass Manifold (090-010)	12V Solenoid, 1200 PSI Valve (169-082)	
068-515		Pressure 0-30 Hg Gauge (074-007)	Hi PSI Bypass Valve (169-081)	
068-517		Chemical Metering Valve (169-160)	Chemical Last Step Pump (111-135)	
068-518		3-Way Chemical Valve (169-0171)	Hi PSI Brass Manifold (Out) (090-008)	
068-519		Poly Water Box Tank (159-105)	Cat Pump	7 in
068-521	Steam Hose	Chemical Jug Outer Tray (166-022)	Automatic Pump Out (111-012)	24 in
068-522		Blower	Silencer (093-082)	3 1/2 in
		Final Exhaust Adapter (001-087)	Heat Exchanger Core (038-031)	2 1/4 in
068-523	3/8"	Hi Temp Oil Drain		17 in
068-525		Water to Water Heat Exchanger (038-043)	After Burner Heat Exchanger (In) (038-045)	
068-526		Heat Exchanger Core (038-031)	Silencer (093-082) (450D Diesel)	3w in
068-587	3/8"	Throb Hose, Cat Pump	Hi PSI Bypass Valve (169-081)	17 1/2 in
		Throb Hose, Cat Pump	Terminus	17 1/2 in
068-612		Poly Water Box Tank (159-105)	Hi PSI Brass Manifold (090-010)	
068-620		Heat Exchanger Core (038-031)	Silencer (093-082)	4 1/2 in

Cleaning and Chemicals

MAXX 450D/470D/450 Diesel

Section 2-1

Your mobile carpet cleaning plant has been engineered using the latest and most sophisticated technology available to produce the finest carpet cleaning results possible. Despite this, however, it remains only a tool of the carpet cleaning trade, and can produce only as good a job as the person operating it.

CAUTION

The use of some chemicals through your mobile carpet cleaning plant can seriously damage the internal plumbing, high-pressure pump, chemical pump and heat exchangers. These harmful chemicals include concentrated acid (see the pH chart at the end of this section), solvents (including d-Limonene), and some paint, oil and grease removers with a high concentration of solvents.

PRECAUTIONS

There are no short cuts to good carpet cleaning. It requires time, cleaning knowledge and the use of good chemicals. Therefore, the manufacturer recommends the use of spotting agents and traffic lane cleaners, as required, prior to the actual cleaning of carpeting.

The use of some chemicals through your mobile carpet cleaning plant can seriously damage the internal plumbing, high pressure pump and heater. These harmful chemicals include concentrated acid (see the pH chart at the end of this section), solvents, and some paint, oil, and grease removers with a high concentration of solvents.

The manufacturer recommends only the use of chemicals containing rust and corrosion inhibitors and water softening agents to prevent chemical buildup which may lead to component failure and warranty invalidation.

 **CAUTION**

The increased demand for “clear water” rinsing results in the need for special care when using these acid based chemicals in your equipment. The negative side of these products is the corrosive effects the acid can have on metals, including swivels, pumps, heat exchangers, etc.

HydraMaster’s *ClearWater Rinse* has been formulated to protect vital components. HydraMaster will not warranty parts that have been damaged from using unprotected acid products that have obviously caused failures.

CLEANING STROKE PROCEDURE

Purpose:

To eliminate excess moisture remaining in the carpet fiber and the sawtooth appearance which results from diagonal movement of the cleaning tool on all types of carpet.

Procedure:

Always move the cleaning tool in smooth, forward and backward strokes. Apply slight pressure to the forward stroke while the solution is injected into the carpet. When extracting (drying), apply firm pressure on the forward stroke to ensure a positive “lock” for the vacuum and minimize the “hopping” effect resulting on carpet that is not smooth. During the forward and reverse strokes, movement to the right or left should only be accomplished at the extreme rear of the stroke. Overlapping is also important to ensure even application of solution and prevent saturation when cleaning wand is stopped twice at the same point at the rear of the cleaning stroke. This is illustrated at the end of this section.

Failure to adopt this procedure can result in increased chance of “clean streaks,” fiber shrinkage, brownout and longer drying periods.

OVERWETTING

Overwetting is annoying to all concerned, and may leave a bad impression of the cleaning process used.

THESE ARE SEVERAL AREAS THAT WILL CAUSE OVERWETTING

1. Too few vacuum strokes or improper saw-tooth vacuum strokes as shown in the following illustration.
2. Obstructed, cut or kinked hoses.
3. Vacuum tank drain valve left partially open.
4. Clogged vacuum blower filter or vacuum tank lid not sealing properly.
5. Cleaning a heavily foam-saturated carpet without defoamer.
(We recommend crystal type.)

Figure 2-1: pH Chart

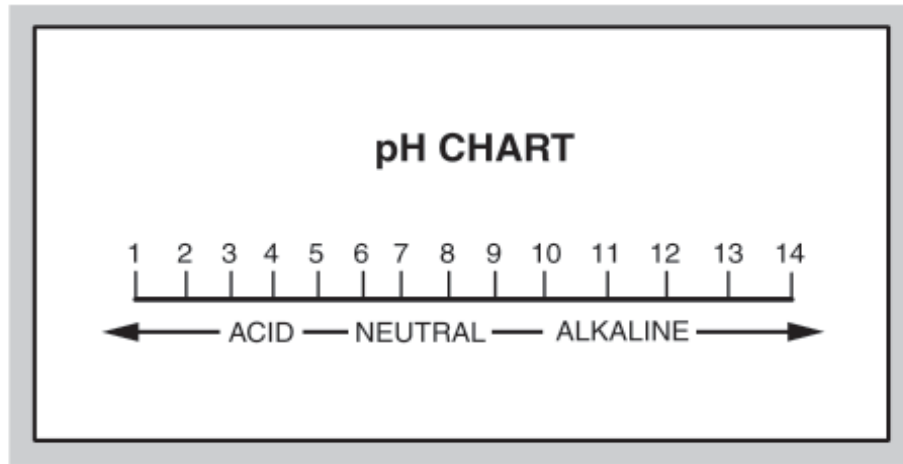
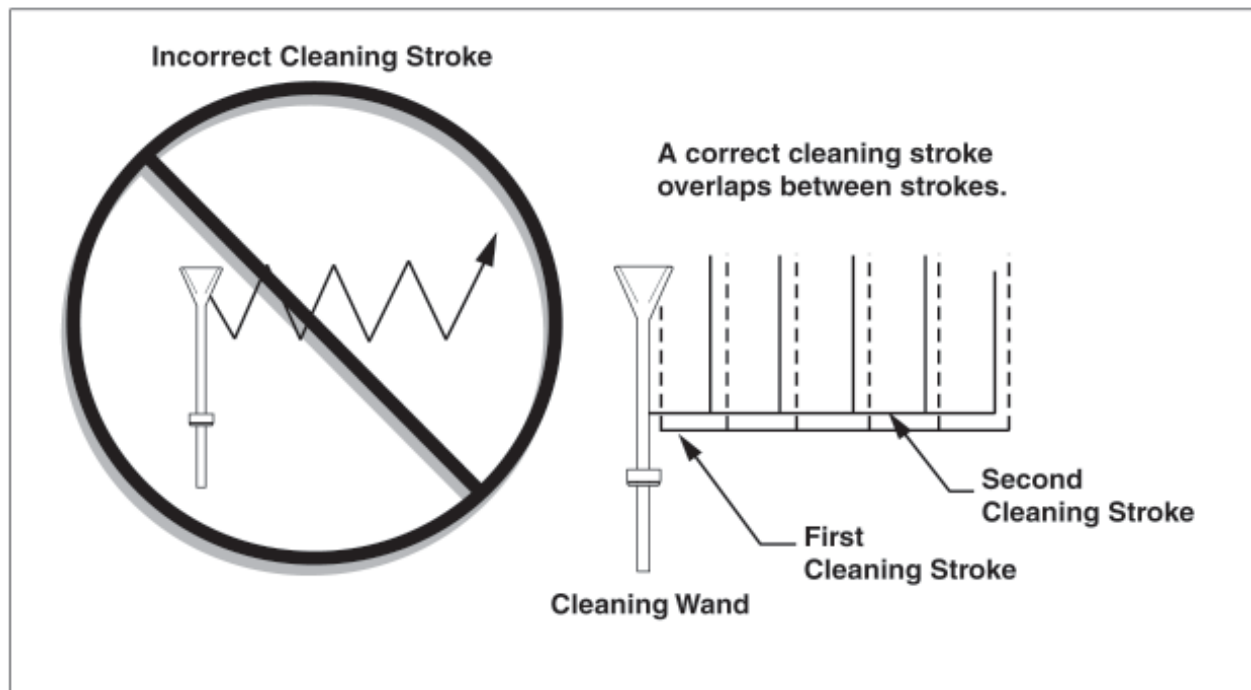


Figure 2-2: Cleaning Stroke Procedure



Operating Instructions

MAXX 450D/470/Diesel

Section 3-1

START UP

1. Perform daily and periodic maintenance as specified in this Owner's Manual.
2. Connect all required hoses, including a garden hose for water supply.
3. Connect the cleaning tool to the length of hose required to perform the cleaning.



Water box must be full prior to ignition.



The machine cannot be *run* in the "IDLE" position for cleaning upholstery, carpet or floor extraction. This will void the warranty.

NOTE: In order to achieve consistent adjustable temperatures, an operating pressure of 200 PSI must be maintained.

NOTE: Under exceptionally long periods of 'No Flow' conditions, the "Over Temp" light may come on momentarily. This indicates that the high temp solenoid is activated to control water temperature.

Carpet or Hard Surface Cleaning

NOTE: The engine throttle has three settings: IDLE, ECONOMY, and HIGH PERFORMANCE.

1. Start the engine with THROTTLE switch in the "IDLE" position. Allow machine to run in idle for **2 - 3 minutes to warm up**.
2. Connect hoses.
3. Connect wand or tool.
4. Move THROTTLE switch to "HIGH PERFORMANCE" mode.
5. If used, turn PUMP IN switch to "ON" (switch light will be illuminated).
6. Turn PUMP switch to "ON" (switch light will be illuminated).
7. Turn DIVERTER switch to "ON" (switch light will be illuminated).
8. Set temperature to desired level.

9. If used, turn PUMP OUT switch to **"ON"** (switch light will be illuminated).
10. Set cleaning pressure at desired level.

Suggested Settings

Carpet Cleaning: 300 - 400 psi;

Hard Surface: 900 -1000 psi or as indicated on the tool.

Note: If pressure is above 900 psi the life of the chemical pump diaphragm may be shortened.

11. Turn the chemical selector valve to the **"PRIME"** position to purge any air from the system.
 - a. If the chemical does not begin to flow through the flowmeter within 60 seconds, remove the chemical PRIME line (the one without the filter) from the chemical container and insert it into the vacuum hose connection at the front of the machine.
 - b. When the chemical begins to flow through the flowmeter, with the flow indicator reading maximum flow and the PRIME line pulsing, turn the chemical selector valve to **"ON"**, and place the chemical PRIME line back into the chemical container.
 - c. Then, while spraying solution from the cleaning tool, adjust the chemical flow by turning the chemical adjustment knob to the desired level.
12. Commence cleaning.

Upholstery Cleaning

NOTE: The engine throttle has three settings: IDLE, ECONOMY, and HIGH PERFORMANCE.

1. Start engine with the THROTTLE switch in the **"IDLE"** position. Allow the machine to run in idle for **2 - 3 minutes to warm up**.
2. Connect hoses.
3. Connect the upholstery tool.
4. Move the THROTTLE switch to **"ECONOMY"** or **"HIGH PERFORMANCE"** mode.
5. If used, turn the PUMP IN switch to **"ON"** (switch light will be illuminated).
6. Turn the PUMP switch to **"ON"** (switch light will be illuminated).
7. Turn the DIVERTER switch to **"ON"** (switch light will be illuminated). During upholstery cleaning if you desire a lower temperature you may want to leave the DIVERTER switch in the **"OFF"** position.

The engine exhaust heat exchanger is bypassed, the heat will be obtained from the engine coolant and blower exhaust heat exchangers.

8. Set the temperature to desired level.
9. If used, turn PUMP OUT switch to **"ON"** (switch light will be illuminated).
10. Set cleaning pressure at desired level (300 –400 psi).
11. Turn the chemical selector valve to the **"PRIME"** position to purge any air from the system.
 - a. If the chemical does not begin to flow through the flowmeter within 60 seconds, remove the chemical PRIME line (the one without the filter) from the chemical container and insert it into the vacuum hose connection at the front of the machine.
 - b. When the chemical begins to flow through the flowmeter, with the flow indicator reading maximum flow and the PRIME line pulsing, turn the chemical selector valve to **"ON"**, and place the chemical PRIME line back into the chemical container.
 - c. Then, while spraying solution from the cleaning tool, adjust the chemical flow by turning the chemical adjustment knob to the desired level.
12. Commence cleaning.

Flood Extraction

NOTE: The engine throttle has three settings: IDLE, ECONOMY, and HIGH PERFORMANCE.

1. Start the engine with the THROTTLE switch in the **"IDLE"** position. Allow the machine to run in idle for **2 - 3 minutes to warm up**.
2. Connect hoses.
3. Connect wand or tool.
4. Move the THROTTLE switch to **'HIGH PERFORMANCE'** mode.
5. If used, turn PUMP OUT switch to **"ON"** (switch light will be illuminated).
6. Commence water extraction.

*Note: Make sure the diverter and pump switch are in the **"OFF"** position.*

Shut Down

1. Flush clear water through the chemical system for 10 seconds. Turn off the chemical flowmeter.
2. Cool the machine by lowering the adjustable thermostat to the "**LOW**" position and the DIVERTER CONTROL switch to the "**OFF**" position while spraying the cleaning wand into the vacuum hose for three to five minutes. The chemical will be flushed from the unit, hoses and cleaning tool.

NOTE: If the machine is not properly cooled, the water box can overflow.

3. Remove the vacuum hose.
4. At this time, the blower should be lubricated with an oil-based lubricant. See **Lubrication** in the Blower Operation and Maintenance Manual included in Section 8 of this document.

NOTE: If freeze guarding is necessary, perform the freeze guard procedure at this time. (see Section 4 for **Freeze Guarding**)

5. Lower the engine RPMs to idle.
6. Turn the key off.
7. Drain the water box.
8. Drain the vacuum tank. The vacuum filter should be cleaned prior to mobilization of the van.

NOTE: In accordance with the EPA, state and local laws, **do not dispose of waste water into gutters, storm drains, streams, reservoirs, etc.**

9. Perform daily maintenance as prescribed in this manual.

Freeze Guard

ANTIFREEZE PROCEDURE

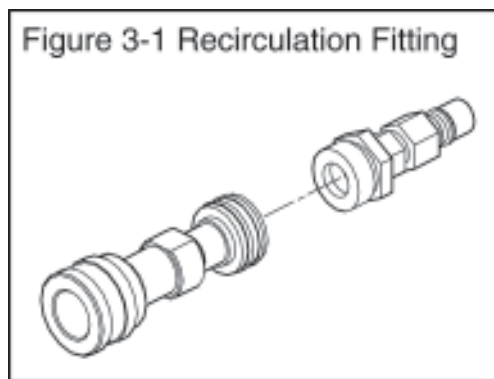
1. Begin by attaching your garden hose, or pump-in hose, to the machine. Now, remove the chemical line from the chemical jug and place it in a 50/50 mixture of antifreeze and water. Turn ignition switch on. Spray water. Allow the antifreeze solution through the chemical flowmeter.
2. Remove the garden hose, or pump-in hose. Now, open the water box drain valve and drain all the water from the machine.
3. With the machine drained of water, close the water box drain and pour one (1) gallon of 50/50 antifreeze and water mix into the water box. Run the machine until you see the antifreeze mix flowing through the wand. This should use approximately $\frac{2}{3}$ of the solution.

When using the Recirculation Kit (part no. 078-058), fill a third of the water box with a 50/50 antifreeze mix.

Attach the recirculation fitting provided in the kit to the garden hose quick-connect (see illustration to right) and this combination to the front of the machine.

Attach one section of female/female solution hose to the outgoing fitting on the front of the machine and the other end to the garden hose and recirculation fitting combination that is attached to the front of the machine (or as many sections as you want, if you wish to freeze guard.

4. Start the machine and allow it to run for two (2) minutes.



ANTIFREEZE PROCEDURE (cont.)

5. Remove the garden hose inlet fitting from the end of your garden hose and plug it into the front of the machine. Leave it plugged in until the next time the machine is used.

With the hoses and wand connected, run the machine and spray the water/antifreeze solution out of the wand until the 'low water' switch in the water box shuts the pump clutch off. Your machine is now freeze-protected.

SOLUTION HOSE AND WAND FREEZE GUARD PROCEDURE (OPTIONAL):

6. Attach the solution hoses and wand to the machine. (Dependent upon the amount of hose attached, more antifreeze solution may be needed in the water box. With the machine running, spray the wand into a container to recapture the antifreeze solution. Continue to spray the wand until the pump clutch shuts off.

Recovering Antifreeze for Re-Use:

Open the water box drain valve and allow the antifreeze solution to drain into a sealable container so that it may be used again.

Before cleaning with the machine again, flush the remaining antifreeze solution from the system by spraying water through the hoses and wand until all signs of antifreeze are gone.



One manufacturer of antifreeze cautions:

“WHEN DISPOSING OF USED ANTIFREEZE COOLANT: Follow local laws and regulations. If required, dispose at facilities licensed to accept household hazardous waste. If permitted, dispose in sanitary sewer systems. Do not discard into storm sewers, septic systems, or onto the ground.”

ANTIFREEZE PROCEDURE (cont.)

WARNING

This warning appears on the label of one brand of antifreeze:

“HARMFUL OR FATAL IF SWALLOWED. Do not drink antifreeze coolant or solution. If swallowed, induce vomiting immediately. Call a physician. Contains Ethylene Glycol which caused birth defects in animal studies. Do not store in open or unlabeled containers.

“KEEP OUT OF REACH OF CHILDREN AND ANIMALS.”

FREEZE PROTECTION OF THE PUMP-IN SYSTEM

1. Drain the fresh water tank.
2. Remove the garden hose adapter from the pump-in pump hose and position the hose so it is pointing outside the van.
3. Turn on the pump-in pump and run for 1-2 minutes till all the water is purged from the hose.

NOTE: The next time the unit is used it may take a few minutes before the water box begins to fill.

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Maxx 450 Diesel

MAXX 450D/470D/450 Diesel
Section 4-1

Figure 4-1 Diesel Fuel Flow Diagram

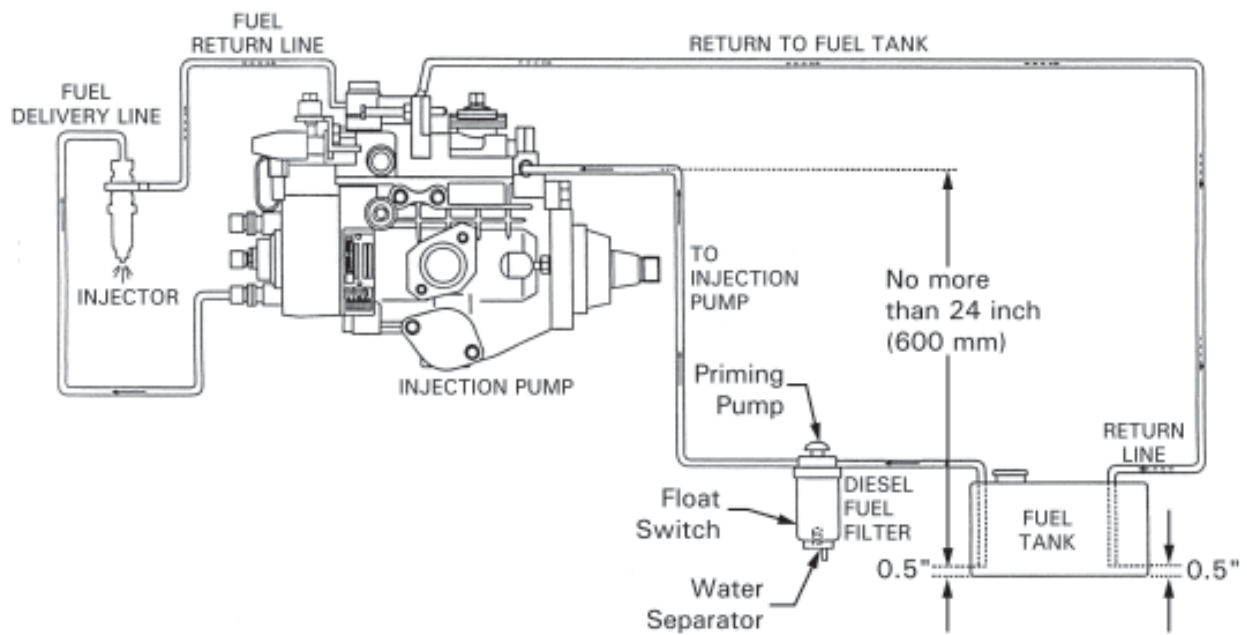


Figure 4-2 Diesel Fuel Filter with Manual Priming Pump, Water Separator with Electric Motor

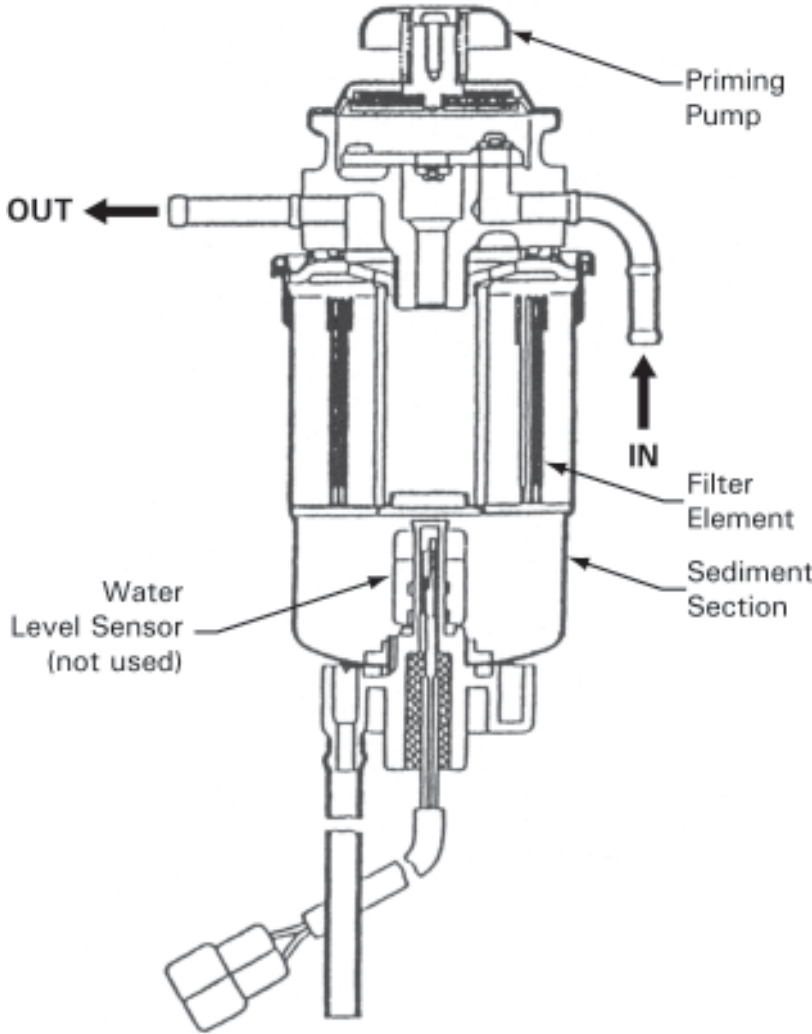


Figure 4-3 Wiring Schematic - Diesel Only
D-4913 Rev C

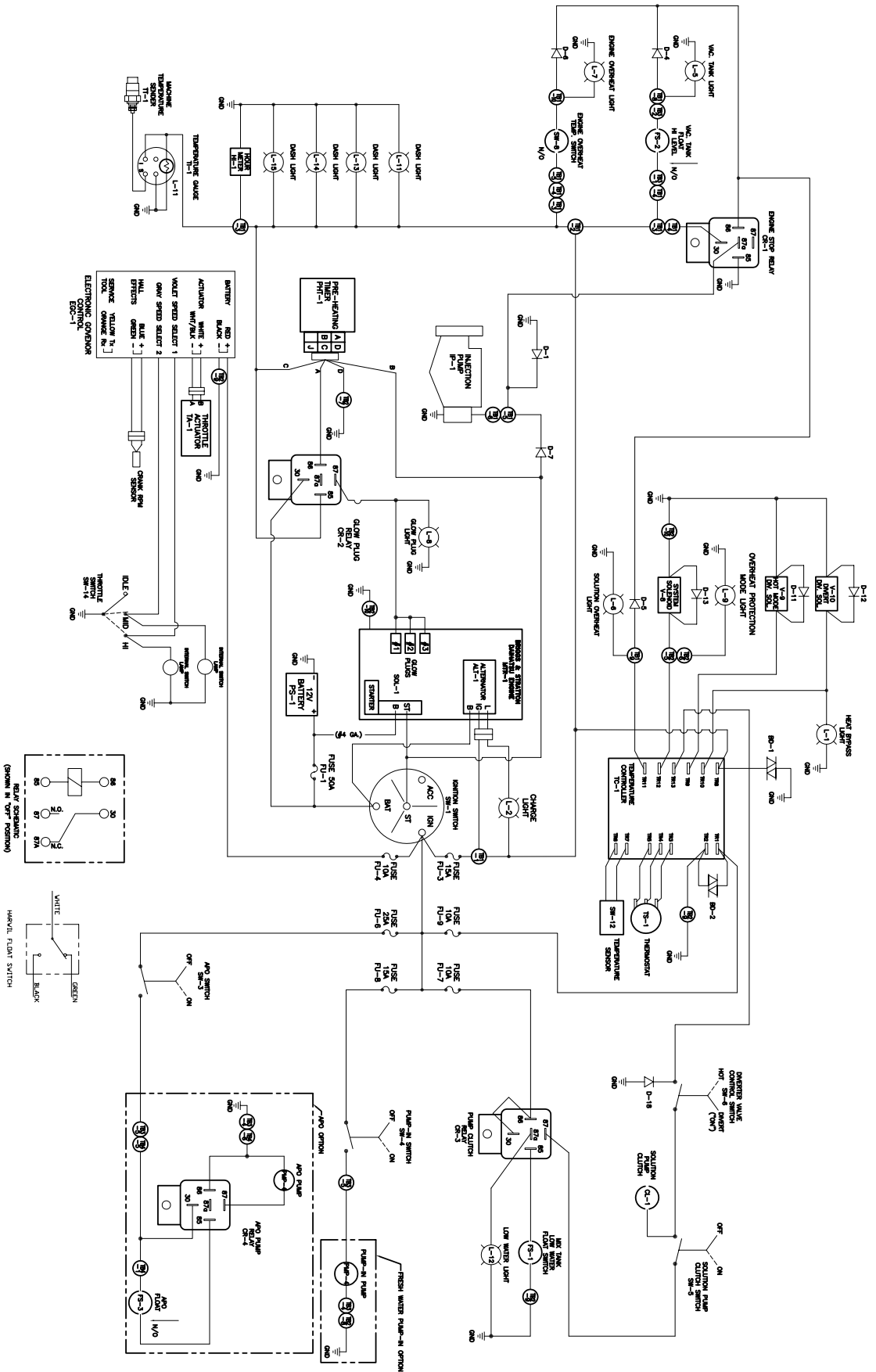


Figure 4-4 Wiring Diagram-Diesel Only
D-4912 Sht 2, Rev G

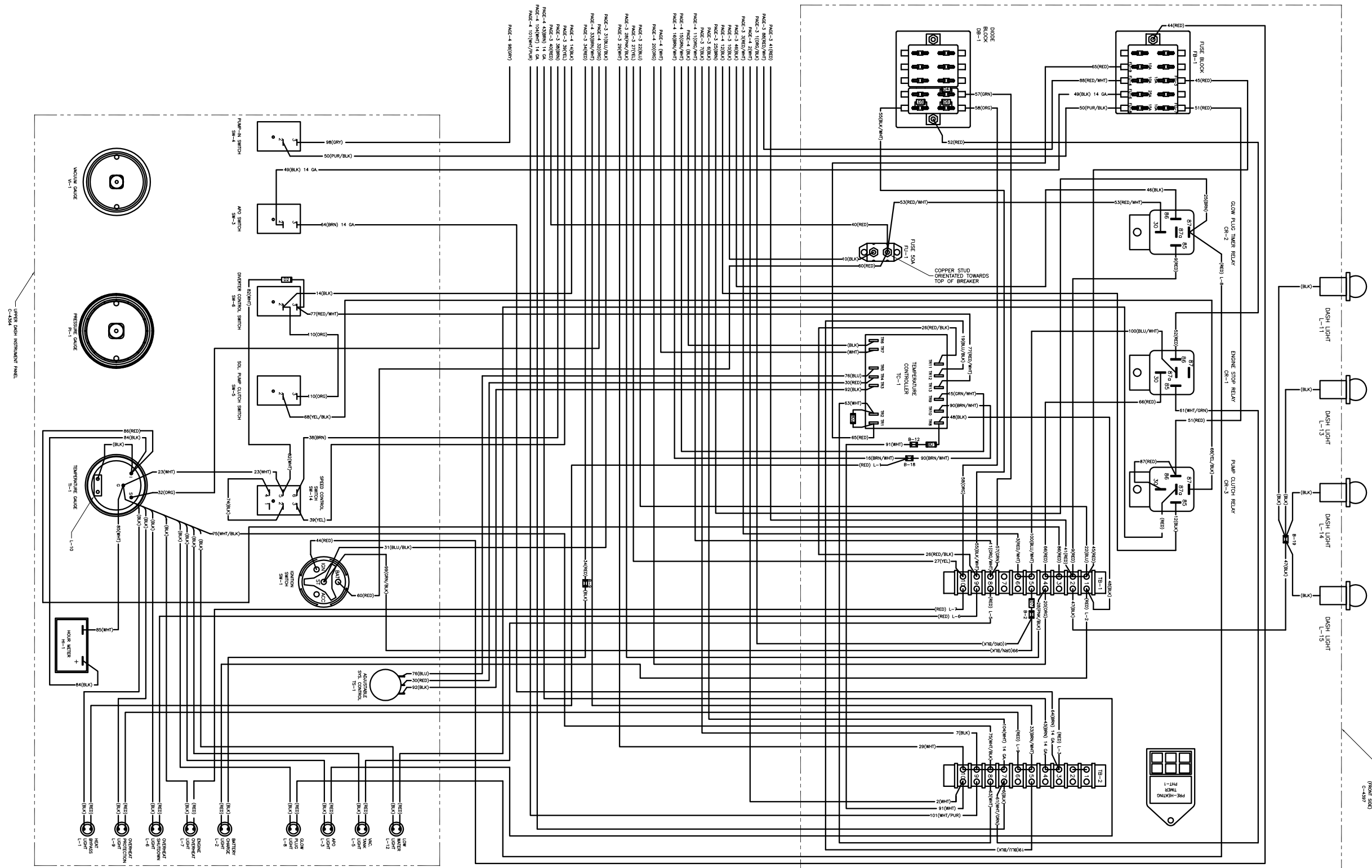


Figure 4-5 Wiring Diagram-Diesel Only
D-4912 Sht 3, Rev G

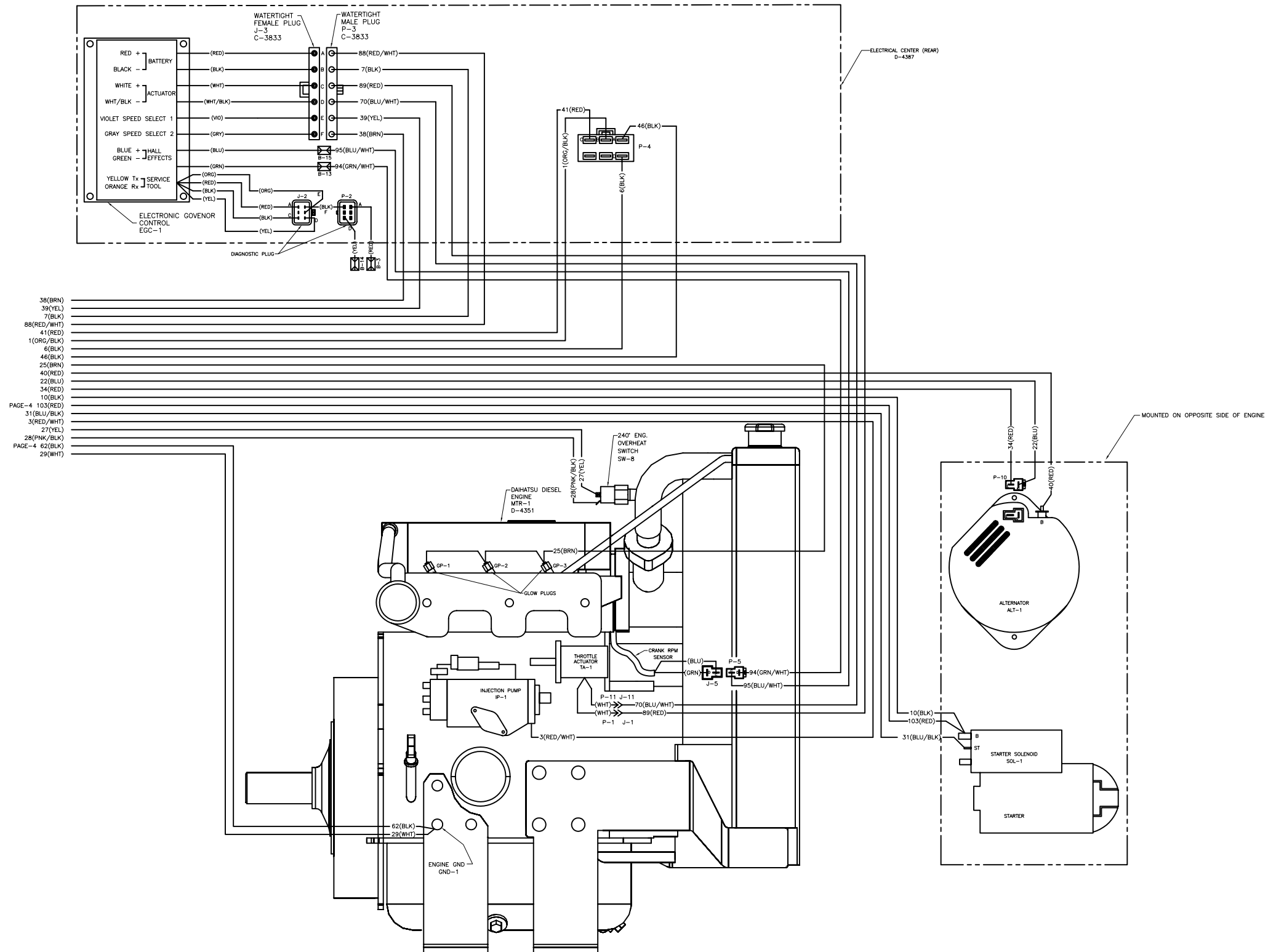
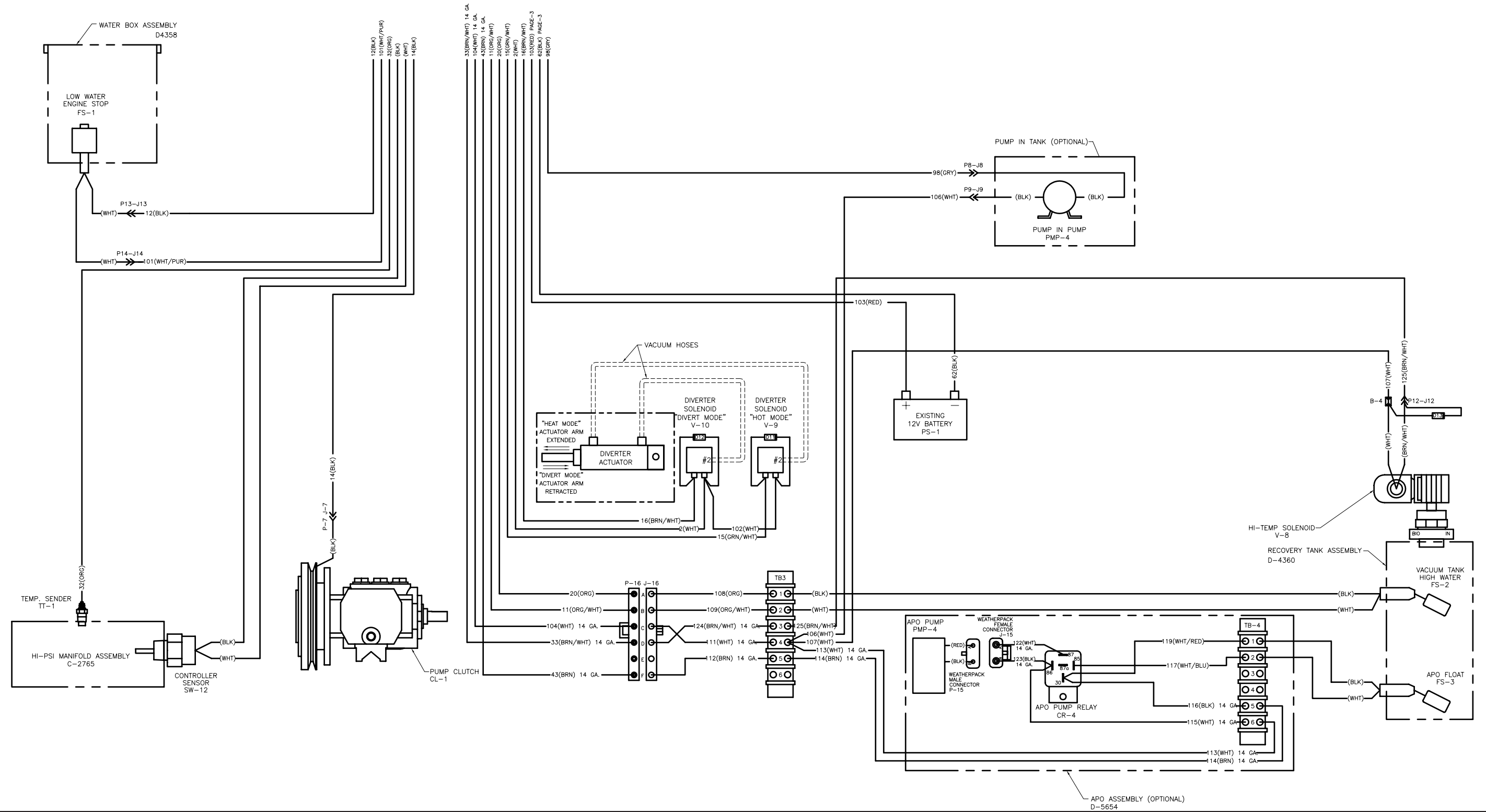


Figure 4-6 Wiring Diagram-Diesel Only
D-4912 Sht 4, Rev G



Water and Chemical System

MAXX 450D/470D/450 Diesel

Section 5-1

This high pressure chemical system has been designed to be simple and trouble free.

WATER AND CHEMICAL FLOW OPERATION

The chemical pump draws the chemical from the inlet filter which is in the chemical container. It flows through the flow meter indicating the GPH's of chemical being used. The chemical then flows through the chemical pump to the chemical selector valve. The chemical valve can be used to prime the pump (evacuate air from the system), inject chemical into the system or turn the chemical flow off. In the "ON" position, chemical flows through the metering valve, and is injected into the heated water path just prior to its leaving the machine.

The low water float switch in the water box, is a safety switch that is designed to protect your system from sudden or unexpected loss of water supply. If, for example, the water source at the house were turned off, the water level of the water box would drop, activating the low water float switch, which automatically disengages the system and prevents the water pump from running dry.

The desired chemical injection ratio may be obtained by an adjustment of the chemical flowmeter during the spraying of water through the cleaning tool.

CHEMICAL SYSTEM MAINTENANCE

The chemical lines may need to be flushed with vinegar periodically to prevent abnormal chemical build-up. This flushing may be done by removing the clear plastic hose from the chemical jug and inserting it into a one quart container of vinegar. This should be done with the chemical flowmeter setting 10 GPH. Simply spray water from the wand until the quart of vinegar is exhausted. Then repeat the process with one quart of clear water to void all lines of vinegar.

MAXX 450D/470D/Diesel

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Figure 5-1 Solution Flow Diagram
D4382 Sht 1 Rev A

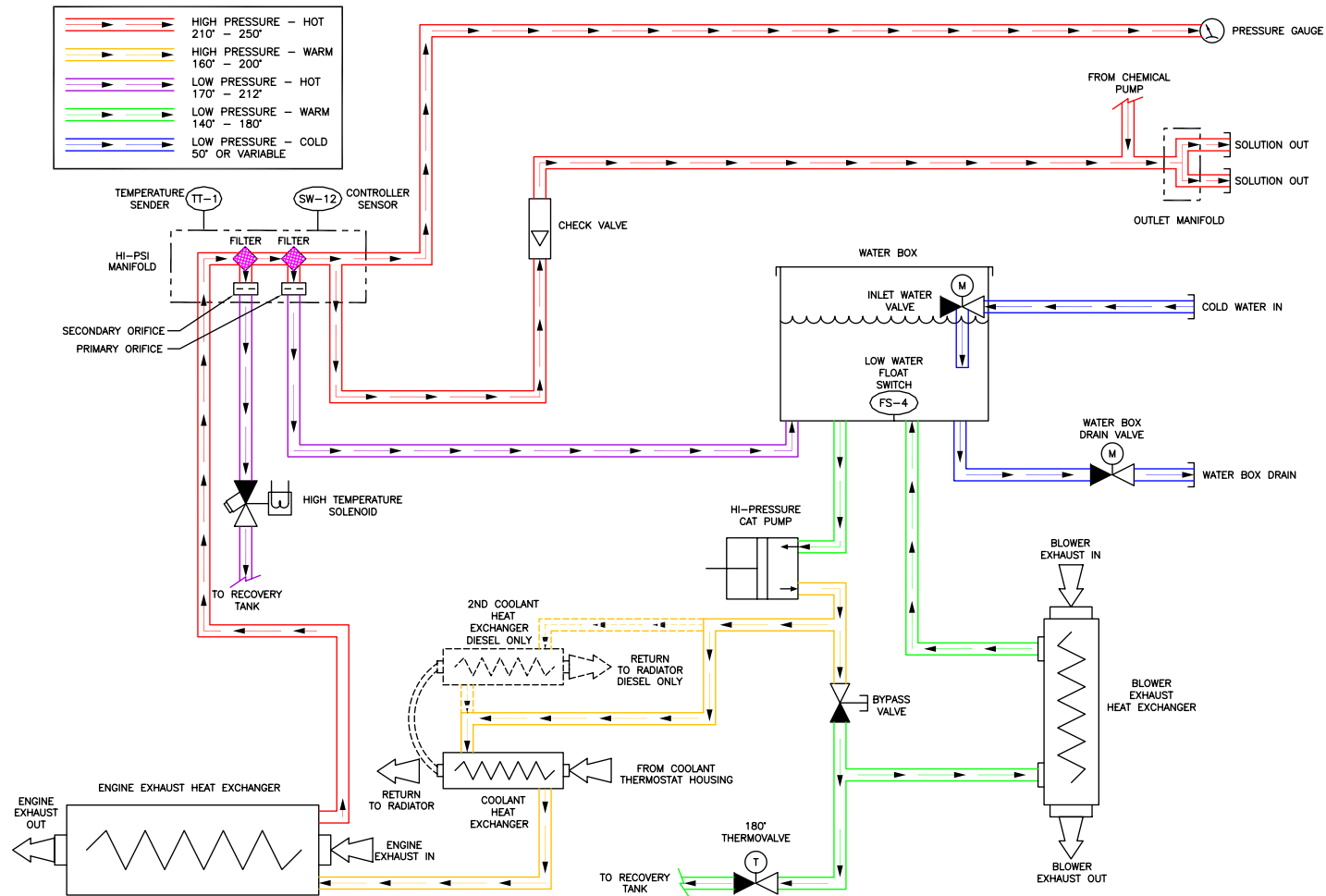


Figure 5-2 Chemical System Flow Diagram

D4382 Sht 2 Rev A

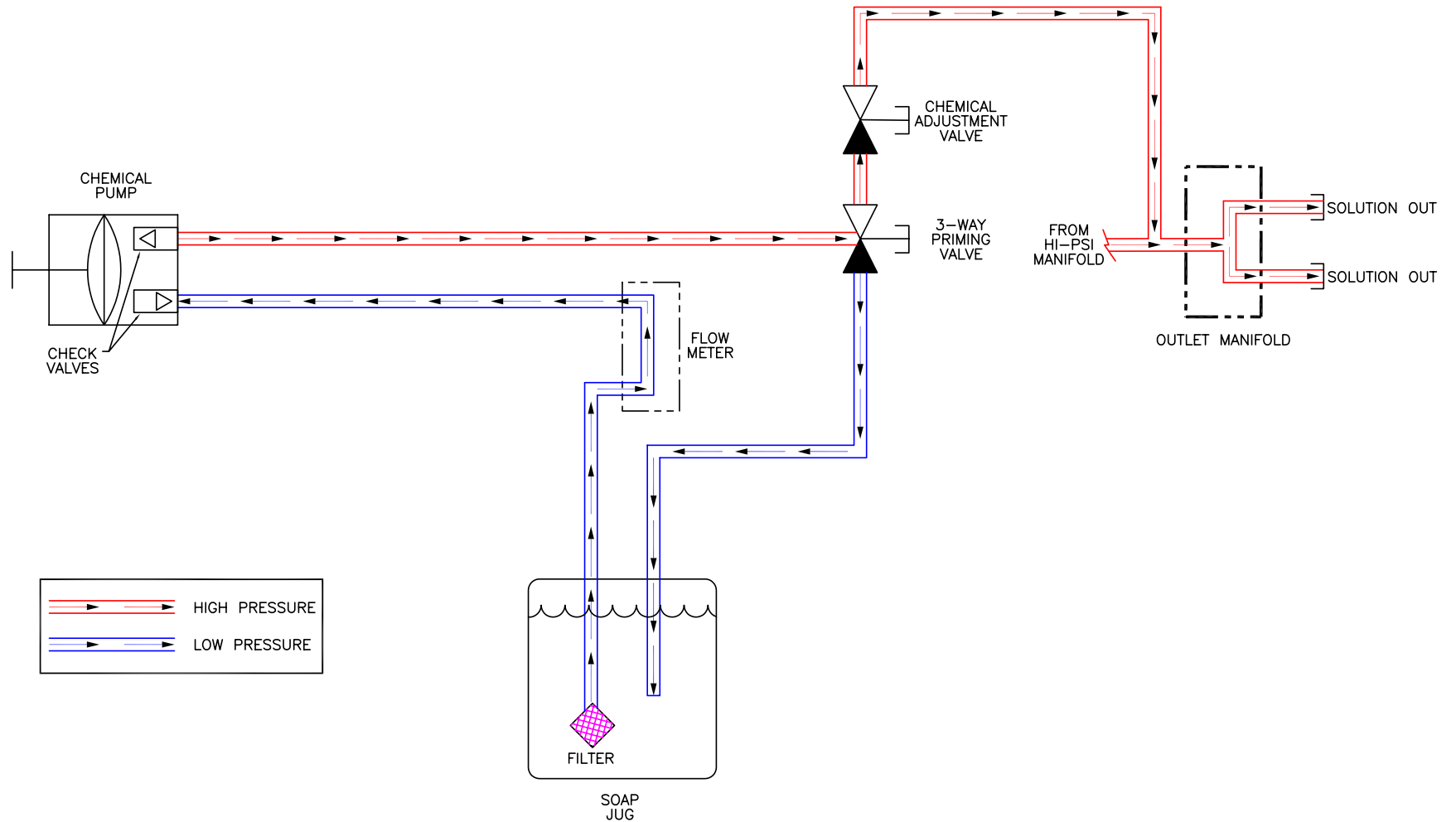
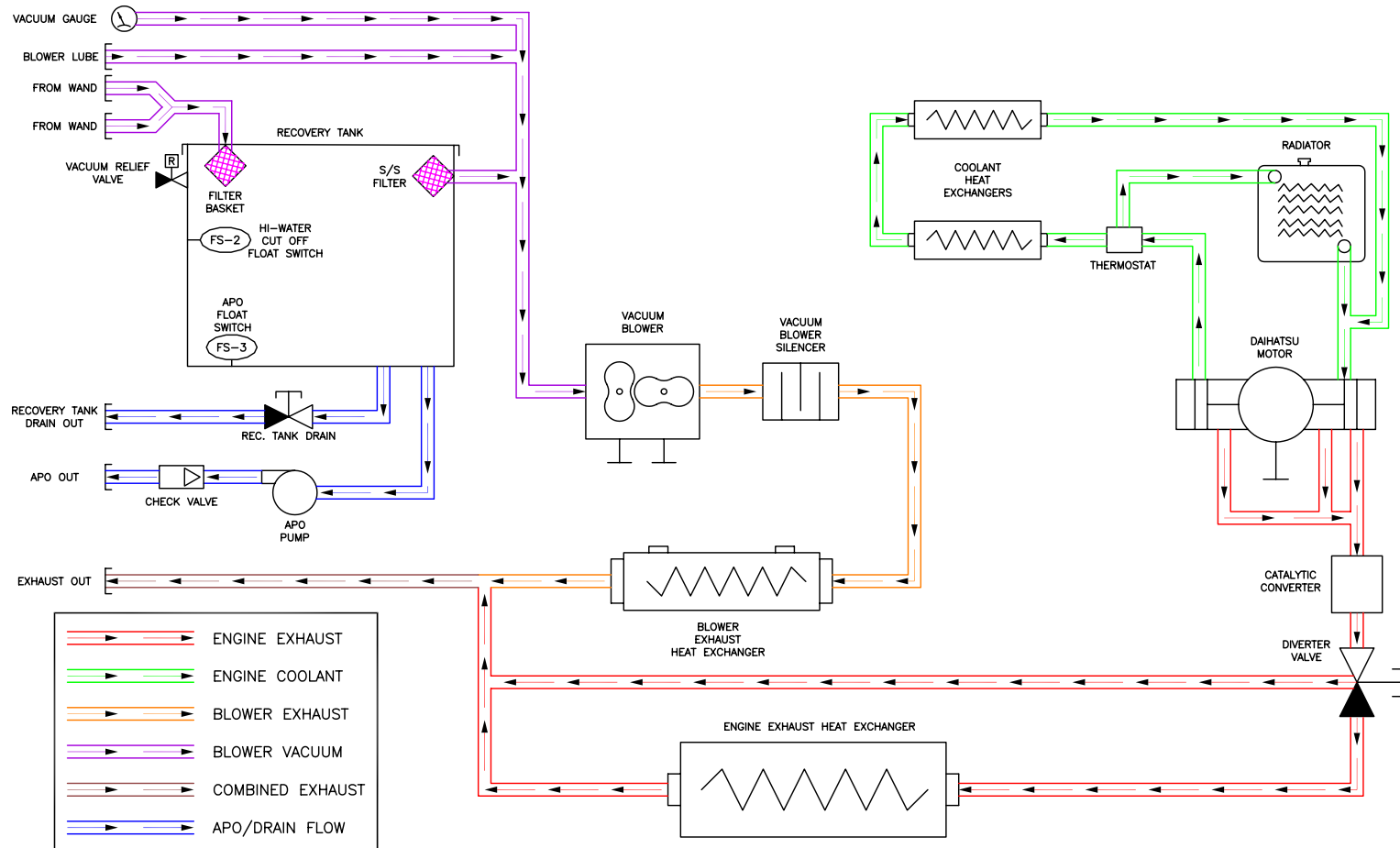


Figure 5-3 Exhaust, Vacuum, Coolant and APO Diagram
D4382 Sht 3 Rev A



Heating System Troubleshooting

1.0. Machine overheats and shuts down

- 1.1. **Poor ventilation in vehicle.** All cargo area doors must be open for proper ventilation. Roof vents are strongly recommended for machines that are operated in hot climates. Any item that might restrict air flow to the machine such as other equipment or a solid divider between cargo and passenger areas should be moved or modified to permit proper air flow.
- 1.2. **One or both orifices or filter screens are restricted.** Remove and inspect. Clean as necessary. Note: Make sure orifices are not interchanged.
- 1.3. **High-pressure dump solenoid is restricted.** Inspect solenoid and the hose that delivers water to it. Clean or replace as necessary.
- 1.4. **Diverter valve is stuck or is out of adjustment.** Operate diverter valve manually (*make sure exhaust system is cool*) to determine if the movement of the valve is restricted. Repair or adjust as necessary.
- 1.5. **Diverter valve and/or high-pressure dump solenoid are not functioning.** Check the fuses that provide power to the temperature controller.
 - 1.5.1. If a fuse is blown, inspect electrical system for damaged wiring. Repair or replace as necessary.
 - 1.5.2. If fuse is good, refer to qualified service technician to inspect temperature controller and RTD sensor.
- 1.6. **Engine RPM is too high.** Check RPM with accurate tachometer and adjust as necessary to 3000 RPM. *Note: This should be done by a qualified service technician.*

2.0. Unable to achieve normal cleaning solution temperature

- 2.1. **System is in Divert mode or temperature control knob is turned down.** Inspect divert switch and temperature control. Change or adjust.
- 2.2. **Diverter valve is stuck or is out of adjustment.** Operate diverter valve manually (*make sure exhaust system is cool*) to determine if the movement of the valve is restricted. Repair or adjust as necessary.

- 2.3. **System will not switch into “Cleaning” mode.** Inspect the two fuses that supply 12 volts to the temperature controller. If they have blown, carefully inspect wiring for damage before replacing fuse.
 - 2.3.1. If the fuses are okay, refer to a qualified service technician to inspect the temperature controller and RTD sensor.
 - 2.4. **The air pump is not functioning properly.** Check the air-flow from the line that feeds air to the catalytic converter. If there is no (or very little) air-flow, replace the air pump.
 - 2.5. **Cleaning solution flow is too great.** Measure flow at cleaning tool.
 - 2.5.1. Cleaning tool jet is too large or worn out. Inspect jet. Replace if necessary.
 - 2.5.2. Cleaning solution pressure is too high. Adjust pressure to normal. Inspect pressure gauge for accurate reading.
 - 2.6. **Engine RPM is too low.** Check RPM with accurate tachometer and adjust as necessary.
 - 2.7. **Heat exchangers have hard water scale build up internally.** Descale system.
-

Chemical System Troubleshooting

1.0. System will not prime

- 1.1. **Check valves in chemical pump are faulty.** Remove valves and inspect. Clean or replace as necessary.
- 1.2. **Chemical pump diaphragm is faulty.** Remove and inspect. Replace as necessary.
- 1.3. **Check valve in high pressure pump (the one that the chemical pump attaches to) is faulty.** Remove valve and inspect. Clean or replace as necessary.
- 1.4. **Filter on feed line in chemical jug is clogged.** Inspect and clean.
- 1.5. **Feed line from chemical jug is loose, pinched or cut.** Inspect and repair.
- 1.6. **Three-way prime valve is faulty.** Check valve for leaks between ports. Replace as necessary. *Note: if the chemical system has been run dry, it is frequently necessary to insert the prime hose from the chemical jug into the vacuum inlet for a “boost” to purge all of the air from the system. Machines produced after April, 2001 will have the prime hose connected directly to the vacuum system.*

2.0. Chemical flow is unstable or low

- 2.1. **Air in lines.** Check that all fittings and connections are tight and in good condition. Repair or replace as necessary.
 - 2.2. **Filter screen in chemical jug is partially clogged.** Inspect and clean.
 - 2.3. **Three-way chemical valve is faulty.** Inspect valve for leaks between ports. Replace as necessary.
 - 2.4. **Chemical metering valve is faulty or partially obstructed.** Inspect valve and clean or replace as necessary.
 - 2.5. **High pressure check valve is faulty.** Remove and inspect. Clean or replace as necessary.
-

3.0. Solution jug fills with water

- 3.1. **Three-way chemical valve is defective.** Inspect valve for leaks between ports. Replace as necessary.
 - 3.2. **Inlet check valve in chemical pump is faulty.** Remove and inspect valve. Clean or replace as necessary.
-

4.0. Chemical in water box

- 4.1. **Chemical pump diaphragm is faulty.** Remove and inspect. Replace as necessary.
- 4.2. **High-pressure check valve is faulty.** Remove and inspect. Clean or replace as necessary.

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Pump Maintenance

MAXX 450D/470D/450 Diesel

Section 6-1

DAILY

Check the oil level and the condition of the oil. The oil level should be up to the center of the sight glass on the back of the pump.

Use a 30 weight, non-detergent oil.



If the oil becomes discolored and contaminated, one of the oil seals may be damaged. Refer to the Service Section.

Do not operate the pump if the crankcase has been contaminated with water.



Do not leave contaminated oil in the pump housing or leave the housing empty. Remove contaminated oil as soon as it is discovered and replace it with clean oil.

PERIODICALLY

Change the oil after the first 100 hours of operation, and every 400 operating hours thereafter. When changing, remove the drain plug on the oil drain center located on the frame so all oil and accumulated sediment will drain out.



Do not turn the drive shaft while the oil reservoir is empty.



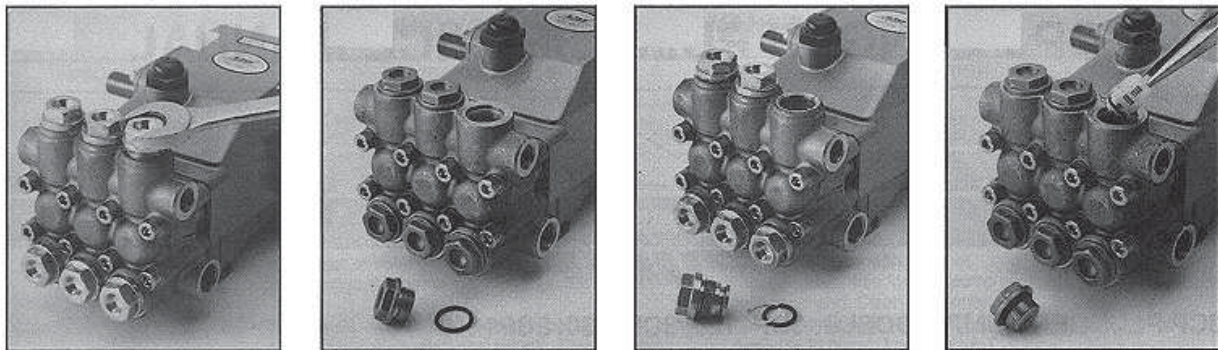
Protect the pump from freezing.

Service

The next few pages explain how to disassemble and inspect all easily serviceable parts of the pump.

CAUTION

Do not disassemble the hydraulic end unless you are a skilled mechanic.
For assistance, contact HydraMaster (425-775-7275) or the distributor in your area.
1. Servicing the Valves (See illustrations above.)



- A. Remove the hex valve plugs (top-discharge, bottom-inlet).
- B. Unthread the valve plug and examine the o-ring under the plug for cuts or distortion. Replace it if it is worn.
Lubricate new o-rings before installing.
- C. Grasp the valve retainer by the tab at the top with needle-nose pliers, then remove the o-ring at the bottom of the valve chamber.
- D. Inspect all valve parts for pitting, gouges, or wear. If wear is excessive, replace valve assembly.
- E. Reinstall valve assemblies:
 1. Using a clean towel, clean the valve chamber.
 2. Install the o-ring into the high pressure manifold.
 3. Install the valve assemblies into the high pressure manifold (the metal side of the valve faces the manifold).
 4. Replace the o-ring on the hex valve plug.
 5. Torque the plug to 72 foot pounds.

2. Removing the High Pressure Manifold

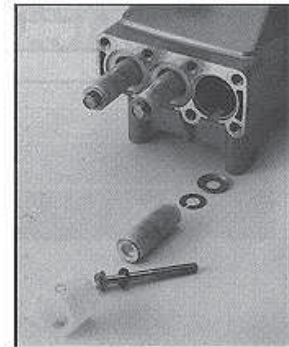
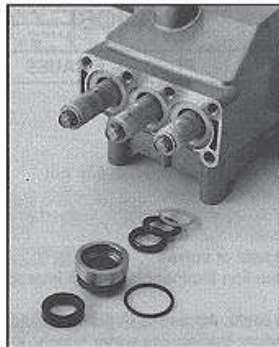
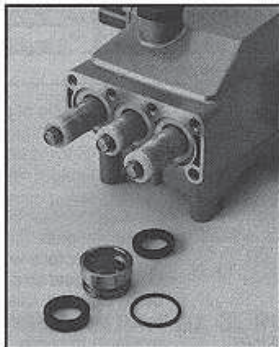
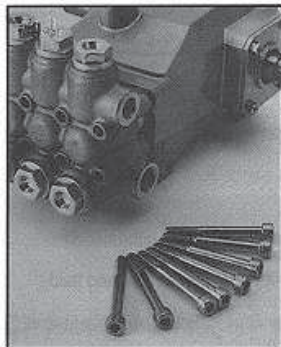
- A. Using an M6 allen wrench, remove all eight of the socket head bolts.
- B. Rotate the crankshaft by hand to start separation of the manifold head from the crankshaft.
- C. Insert two flat-head screwdrivers on opposite sides to further separate the manifold from the crankshaft.



CAUTION

To avoid damage to either plunger or seal, keep the manifold properly aligned with the ceramic plungers when removing it.

- D. Remove the seal retainer from the manifold and inspect for wear.
- E. Examine the ceramic plunger for cracks or scoring (refer to Servicing the Plungers for replacement)



3. Servicing the Low Pressure Seals and High Pressure Seals

(See illustrations above.)

- A. Remove the low pressure seal from the seal retainer using a 90 degree pick tool.
- B. Remove the high pressure seal from the manifold.
- C. Inspect the low pressure seal and high pressure seal for wear and replace if necessary.
- D. Reinstall the low pressure seal:
 1. Install the low pressure seal into the seal retainers with the garter spring down.
- E. Reinstall the high pressure seal:
 1. Lubricate the seal chamber in the manifold.
 2. Carefully square the high pressure seal into position by hand with the grooved side down (metal back facing out).

Servicing the Low Pressure Seals and High Pressure Seals (cont.)

3. Examine the seal retainer's o-ring and replace if worn. Lubricate the new o-ring before installing.
4. Next, press the seal retainers into the manifold until completely seated.

4. Servicing the Plungers (See illustrations above step 3.)

- A. Using a hex tool, loosen the plunger retainer about three to four turns. Push the plunger back to separate it from the retainer and finish unthreading the plunger retainer by hand.
- B. Unthread the plunger retainer with sealing washer.
- C. Remove the ceramic plunger, keyhole washer and barrier slinger from the plunger rod.
- D. Reinstall the ceramic plungers:
 1. Examine the sealing washer on the plunger retainer and replace it if it is cut or worn. Lubricate the new sealing washer for ease of installation and to avoid damage.
 2. Apply Loctite 242™ to the threads of the plunger retainer and press it into the ceramic plunger. Thread hand tight, then torque the bolt to 4.4 foot pounds.
 3. Install the seal retainer with holes to the top and bottom, and forward.

5. Reinstall High Pressure Manifold

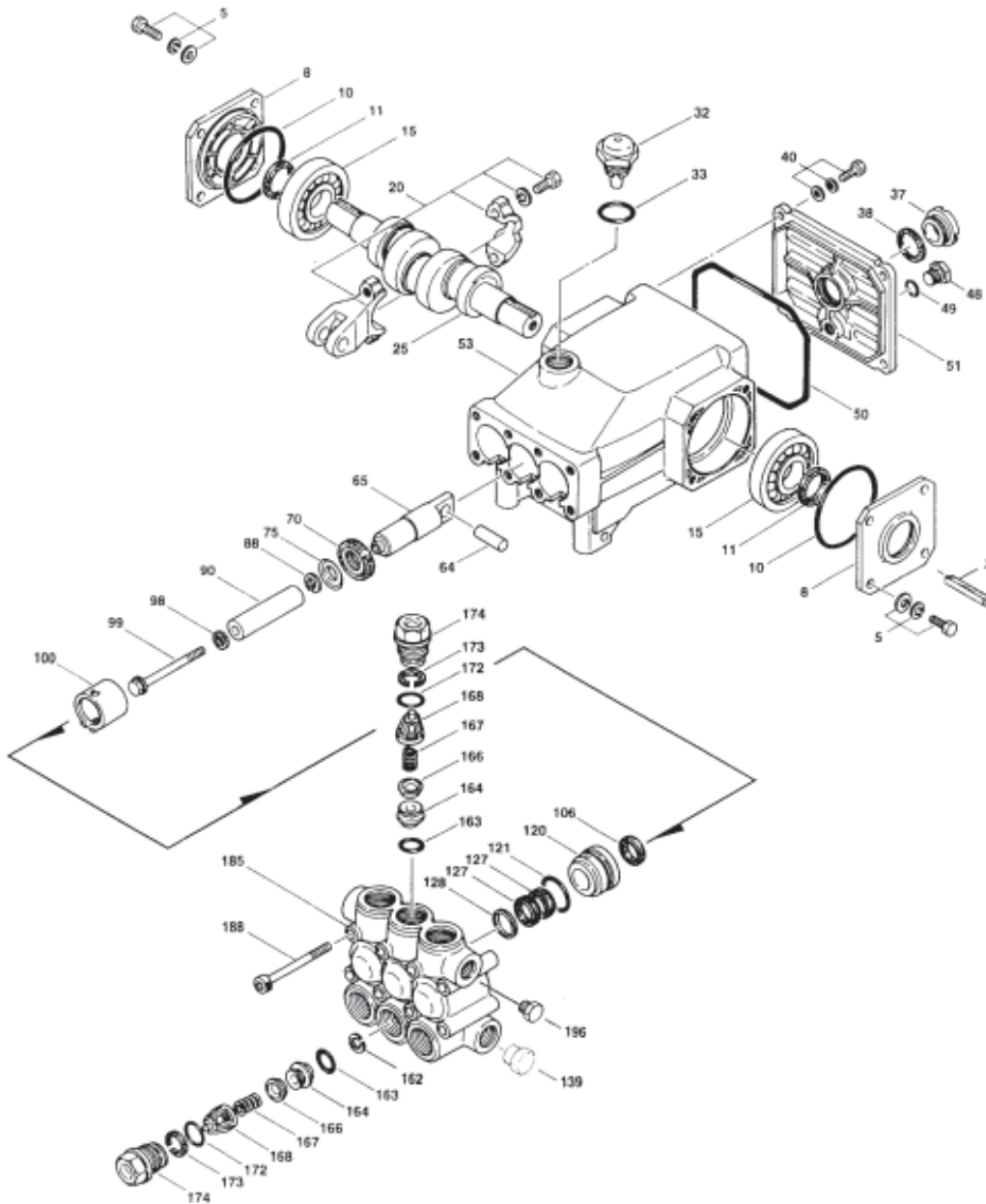
- A. Slip the seal retainer over the ceramic plungers with the holes to the top and bottom and forward.
- B. Turn the shaft by hand to line up the plungers so that the end plungers are parallel.
- C. Lightly lubricate the plungers and carefully slide the manifold head onto the plungers while supporting it from the underside to avoid damaging the plungers.
- D. Reinstall the socket head bolts and torque to 4.4 foot pounds.

6. Servicing the Crankcase

- A. While manifold, plungers, and seal retainers are removed, examine the crankcase seals for wear.
- B. Rotate the crankshaft oil seal externally for drying, cracking or leaking.
- C. Consult your HydraMaster distributor if crankcase servicing is necessary.

Torque Chart				
		Torque		
Pump Item	Thread	Inch Pounds	Foot Pounds	Nm
Plunger Retainer	M6	55	4.4	6.2
Manifold Bolt	M6	55	4.4	6.2
Valve Plugs	M22	870	72.3	100.0
Bearing Case Screws	M6	50	4.0	6.0
Crankcase Cover	M6	50	4.0	6.0
Bubble Oil Gauge	M28	45	3.6	5.0
Mounting Bolts	M8	115	9.4	13.0

Figure 6-1 Cat Pump



Cat Pump Parts List

ITEM	PART NO.	DESCRIPTION	QTY
2	30047	Key (M5)	1
5	92519	Screw, Sems HHC, Bearing Cover (M6x16)	8
8	46901	Cover, Bearing	2
10	14028	O-Ring, Bearing Cover	1
11	43222	Seal, Oil, Crankshaft	2
15	14480	Bearing	?
20	46829	Rod, Connecting, Assembly	2
25	46927	Crankshaft, Dual End	3
32	45690	Cap, Oil Filler	1
33	14179	O-Ring, Oil Filler Cap	1
37	43987	Gauge, Oil, Bubble	1
38	44428	Gasket, Flat, Oil Gauge	1
40	92519	Screw, Sems HHC, Crankcase Cover (M6x16)	4
48	25625	Plug, Drain (¼" x 11)	1
49	23170	O-Ring, Drain Plug	1
50	46939	Cover, Crankcase	1
51	14041	O-Ring, Crankcase Cover	1
53	46534	Crankcase	1
64	46615	Pin, Plunger Rod	3
65	46975	Rod, Plunger	3
70	147-013	Seal, Crankcase Oil for 3CP Cat Pump	3
75	43900	Slinger, Barrier	3
88	45697	Washer, Keyhole	3
90	46976	Plunger (M43)	3
98	46730	Seal, Washer	3
99	48201	Retainer, Plunger with Stud (M6)	3
100	46541	Retainer, Seal	3
106	43243	Seal, LPS with Spring	3
120	46625	Case, Seal	3
121	13976	O-Ring, Seal Case	3
125	46652	Seal, HPS	3
139	22179	Plug, Inlet ½"	1
163	17547	O-Ring 85, Valve Seat	6
164	46658	Seat	6
166	43723	Valve	6

Cat Pump Parts List (cont.)

ITEM	PART NO.	DESCRIPTION	QTY
167	43750	Spring	6
168	44565	Retainer, Spring	6
172	17615	O-Ring 75, Valve Plug	6
174	46756	Plug, Valve	6
185	46616	Manifold, Head	1
193	87870	Bolt, HSH, Manifold Head (M8x65)	8
196	22187	Plug, Discharge ³ / ₈ "	1
250	108-055	Protector, 3CP Cat Pump Shaft	1
260	114-003	Rail, Angle - 3CP Cat	1
265	30651	Complete Mounting Kit	1
270	30246	Pulley and Key Assembly	1
299	814841	Complete Head	1
300	078-271	Kit, Seal for 3CP Cat Pump	1
310	078-270	Kit, Valve for 3CP Cat Pump	1
350	30696	Valve Seal Removal Tool	1

High Pressure System Troubleshooting

1.0. Will not come up to normal cleaning pressure

- 1.1. **Pressure adjusting valve is defective or dirty.** Disassemble valve. Repair or replace as necessary.
 - 1.2. **Worn seals or valves in pump.** Test pump output volume directly from pump at normal operating RPM. If volume is below manufacturers specifications, replace seals and inspect for defective valves.
 - 1.3. **Pump RPM is too low.** Check engine RPM and adjust as necessary. Check for loose pump belt. Adjust tension as necessary.
 - 1.4. **High temperature dump solenoid is activated.** Refer to Heating System section IV.
 - 1.5. **Primary system control orifice is missing or loose.** Remove filter and inspect. Tighten or replace as necessary.
 - 1.6. **Primary system control orifice has been exchanged with secondary (hot water dump) orifice.** Inspect and reverse as necessary.
 - 1.7. **Primary orifice is worn.** Measure orifice size and replace as necessary.
-

2.0. No pressure reading on PSI gauge

- 2.1. **Pump switch is not turned on.** Turn on switch
 - 2.2. **No water in mix tank.** Refer to section 5.0
 - 2.3. **Pump belt is broken.** Replace belt.
 - 2.4. **Pump clutch is not activated. There *is no* water in water box.** Check system back to source to locate cause of interruption to water flow.
 - 2.5. **Pump clutch is not activated. There *is* water in the water box.** Check for 12 volts at clutch. If 12 volts is present, replace clutch.
 - 2.5.1. If 12 volts is not present, check fuse that supplies power to the low-water relay. If fuse is good and there is 12 volts at the relay, check low water switch in water box.
 - 2.5.2. If low water switch has no continuity when float is up, replace the switch. If switch is good, replace the low water relay.
-

3.0. PSI gauge reads normal; low pressure from wand

- 3.1. **There is a restriction in the cleaning tool.** Inspect tool jet and clean or replace as necessary. Inspect any filters in the cleaning tool and clean or replace as necessary.
 - 3.2. **There is a defective quick connect in the system.** Inspect each quick connect and replace as necessary.
 - 3.3. **There is a restriction in one of the solution hoses.** Remove quick connects and inspect hoses. Clean or replace as necessary.
 - 3.4. **There are hard water deposits restricting the system between the afterburner heat exchanger and the high-pressure solution connection at the front of the machine.** Descale the machine. If this doesn't solve the problem, disassemble this portion of the system and locate restriction.
-

4.0. Pressure pulsation

- 4.1. **Water in the water-box is too hot and is approaching boiling point.** Check temperature of water in the water-box. If it is too high, refer to Heating System section IV.
 - 4.2. **There is an air leak between the water box outlet and the pump inlet.** Physically check all hoses and fittings for cuts, breaks, cracks or tightness. Repair as necessary.
 - 4.3. **One of the intake or outlet valves in the high-pressure pump is defective or is being held open by debris.** Remove each valve and inspect for correct operation.
-

5.0. Water box empty or fills slowly

- 5.1. **There is a restriction in the water supply system.** Inspect the supply system from the source through the incoming quick connect for kinks, clogs or restricted filters. Clean or repair as necessary.
 - 5.2. **The float valve in the water box is defective.** If there is adequate water flow to the incoming valve in the water box, disassemble and inspect the valve. Repair or replace as necessary.
-

6.0. Water box overflows

- 6.1. **There is either debris caught in the valve or the valve seal is bad.** Disassemble valve and repair or replace as necessary.
 - 6.2. **The float has absorbed water and has lost buoyancy.** Detach float and check to see if it will float to the surface. Replace as necessary.
 - 6.3. **The float has come out of adjustment.** Readjust float as necessary.
-

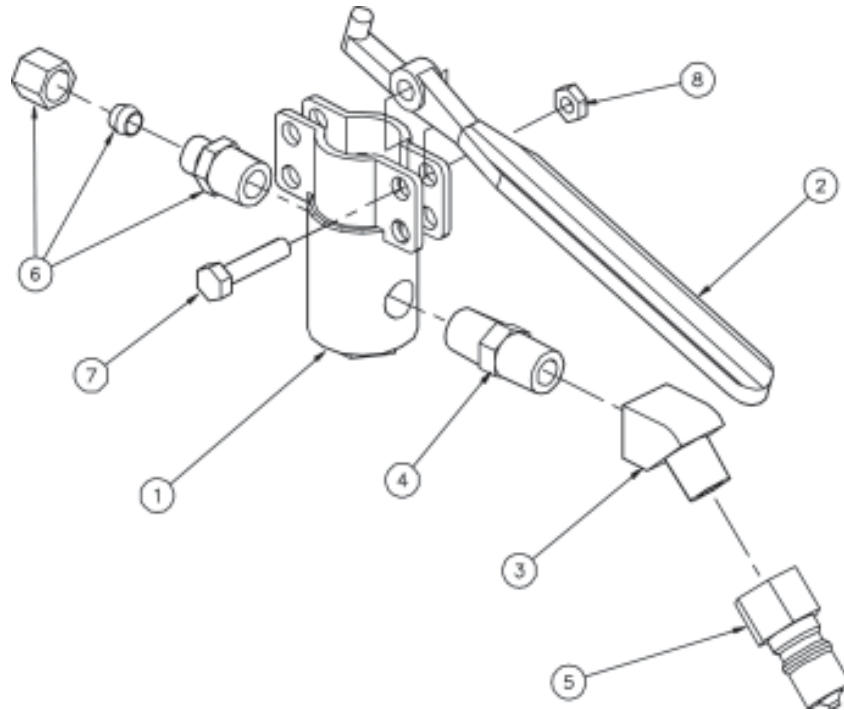
Cleaning Wand Parts

MAXX 450D/470D/450 Diesel

Section 7-1

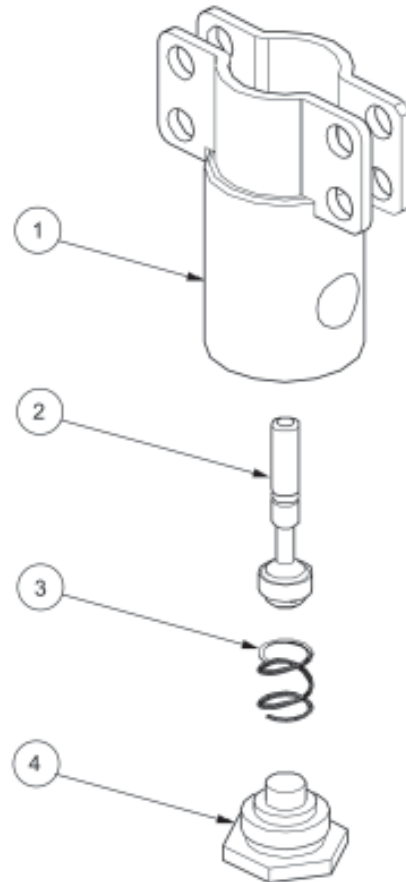
Figure 7-1 Valve Assembly

C3652



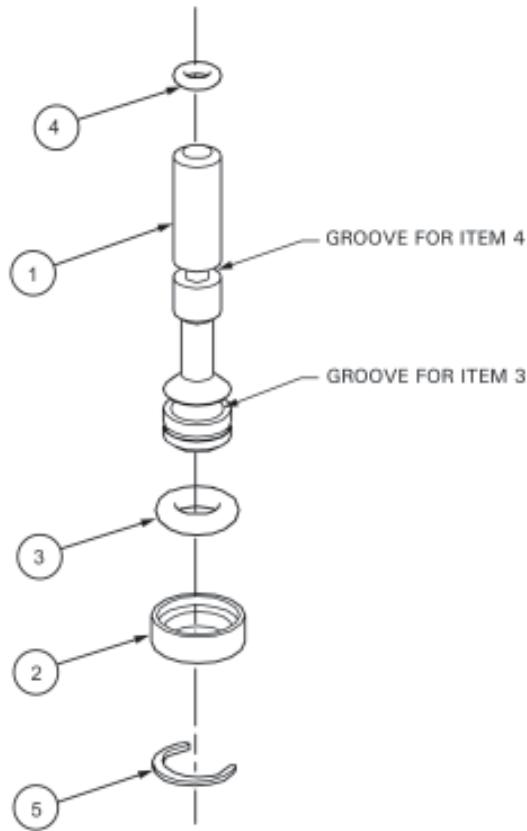
ITEM	PART NO.	DESCRIPTION	QTY
1	169-058	Valve, s/s HM Solution	1
2	167-013	Trigger, Hydra Hoe Valve - Brass	1
3	052-082	Elbow, 1/4" Brass 45 Street	1
4	052-095	Nipple, 1/4" s/s Hex	1
5	052-050	Quick Connect, 440 M with Viton	1
6	052-152	Compression, 1/4" Male Hydra Hoe Fitting	1
7	143-002	Screw, 1/4 - 20 x 1" HHC s/s	1
8	094-009	Nut, 1/4 - 20 s/s Nylock	1

Figure 1-2 Solution Valve Assembly
B1234



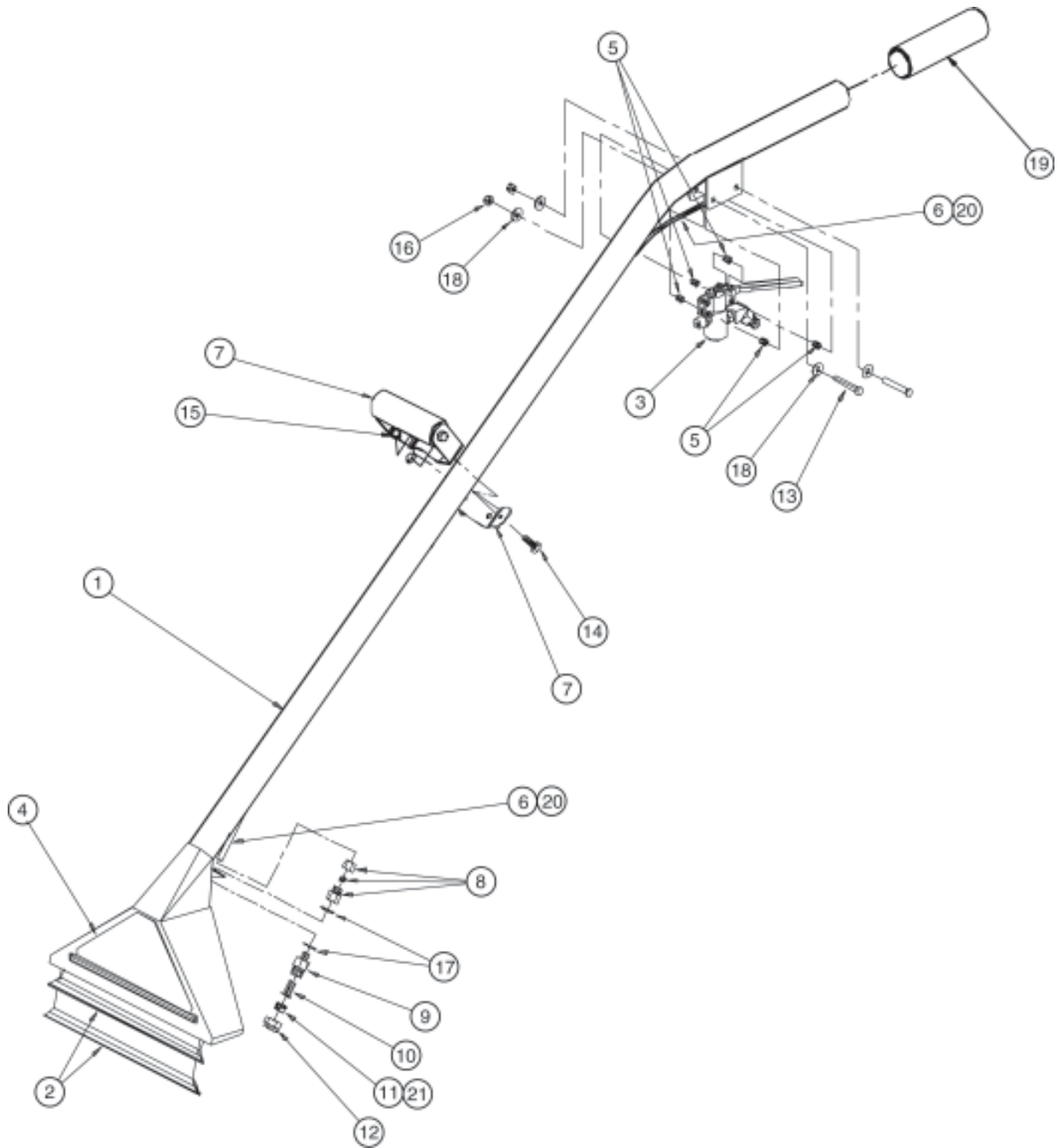
ITEM	PART NO.	DESCRIPTION	QTY
1	600-012-001	Valve Body Sub Assembly	1
2	600-012-002	Valve Stem Sub Assembly	1
3	155-003	Spring, HM Solution Valve	1
4	027-001	Cap, Brass	1

Figure 1-3 Valve Stem Assembly
B3743



ITEM	PART NO.	DESCRIPTION	QTY
1	107-129	Plunger, HM Solution Valve	1
2	139-003	Ring Keeper, HM Solution Valve	1
3	097-010	O-Ring, HM Valve Plunger - Large	1
4	097-022	O-Ring, Solution Valve Flow Meter - Small	1
5	139-004	Ring, Solution Valve Stem Snap	1

Figure 1-4 Hydra Hoe Wand Assembly
C2660



Hydra Hoe Wand Assembly Parts List

ITEM	PART NO.	DESCRIPTION	QTY
1	173-001	Wand Kit, 12" s/s Truckmount	1
2	082-004	Lips, 12" s/s HM Wand (2 Pieces)	1
3	169-055	Valve Assembly, s/s Hydra Hoe with Trigger	1
4	081-015	Label, "HydraMaster" Wand	1
5	154-001	Spacer, ¼ x 5/16 s/s Solution Valve	5
6	168-001	Tube, Hydra Hoe Solution - ¼" OD s/s	1
7	061-006	Handle, Pressure Guide	1
8	052-151	Compression, 1/8" Female Hydra Hoe Fitting	1
9	052-153	Housing, Brass Stabilizer Wand Nozzle Fitting	1
10	186-001	Stabilizer - Jet Assembly Group	1
11	076-005	Jet, #6 s/s Hydra Hoe	1
12	094-028	Nut, Brass Jet Assembly Group	1
13	143-005	Screw, ¼ - 20 x 1 ¾" HHC	2
14	143-012	Screw, 5/16 - 18 x ¾" HHC s/s	2
15	094-035	Nut, 5/16 - 18 s/s Nylock Half	2
16	094-009	Nut, ¼ - 20 s/s Nylock	2
17	174-032	Washer, 3/8" s/s Flat	2
18	174-003	Washer, ¼" s/s Flat	4
19	061-007	Handle Grip Hydra Hoe	1
20	063-003	Harness Wrap, High Temp. ¼" - Gray	4
21	076-045	Jet, 8004E s/s T	1

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Vacuum System

MAXX 450D/470D/450 Diesel

Section 8-1

The vacuum blower in this machine is a positive displacement lobe type. The performance and life of this unit is greatly dependent on the care and proper maintenance it receives.

Because of the close tolerances between the lobes and housing of the vacuum blower, solid objects entering the inlet will damage the internal lobes, gears, bearings or drive system.

To prevent this, a stainless steel filter screen has been placed at the vacuum inlet inside the vacuum recovery tank. This stainless steel screen is finger tight and should be removed for cleaning weekly.

 **CAUTION**

When machine is being run for test purposes and the vacuum inlet on top of the machine is open, caution should be used.

To protect the vacuum blower from overloading and damaging itself, there is a vacuum relief system installed on the vac tank. When the vacuum tank inlet is completely sealed off, a maximum of 14 HG will be attained. At the end of each day, an oil based lubricant should be sprayed into the blower lubrication port before shutting down the machine. If you fail to lubricate the vacuum blower daily, rust deposits and moisture will decrease the life of the vacuum blower.

 **CAUTION**

Foam passing through the blower could lead to serious problems. Therefore, it is important to keep the vacuum tank foam free.

Read the vacuum blower manual carefully for proper oil change and grease application. The maintenance log may differ slightly from the manual, but the truck-mounted carpet cleaning machine application is very demanding of the vacuum blower and therefore it should be maintained more regularly.

 **CAUTION**

The vacuum tank is protected from overflowing by a vacuum tank float kill switch. The switch is not activated by foam, only by liquid.

Vacuum Tank Filters

HydraMaster filters are designed to trap lint that would normally collect at the bottom of your vacuum tank. These filters should be emptied at the end of each job. This will eliminate the build-up of much of the debris in the tank.

Blower Troubleshooting

1.0. Weak vacuum at wand. Gauge reads normal (10" to 14")

- 1.1. **Clogged vacuum hoses or wand tube.** Disconnect hoses and check carefully for an obstruction.
 - 1.2. **Excessive length of hoses connected to machine.** Make sure machine is rated for the conditions under which it is being operated.
-

2.0. Vacuum gauge will not come up to 12" hg

- 2.1. **There is an air leak somewhere in the vacuum system.** Check vacuum relief valve for proper adjustment. Carefully check all vacuum hoses for a cut or break. Check recovery tank lid gasket. Make sure recovery tank drain valve is fully closed.
 - 2.2. **Vacuum blower is turning too slowly.** Check engine RPM. Adjust as necessary.
 - 2.3. **The vacuum gauge is defective.** Test gauge and replace as necessary.
-

3.0. Vacuum gauge reads too high with no hoses attached

- 3.1. **Filter in recovery tank is clogged.** Remove and clean or replace as necessary.
 - 3.2. **Hose from vacuum blower to recovery tank is collapsed internally.** Inspect and replace as necessary.
-

4.0. Noisy vacuum blower

- 4.1. **Vacuum blower is low on oil.** Inspect oil level and replenish as necessary. Note: Running vacuum blower low on oil can cause severe mechanical damage. If this situation occurs, it should be inspected by a qualified service technician.
 - 4.2. **There is internal damage to the blower.** Refer to qualified service technician.
-

5.0. Blower is locked and will not turn

- 5.1. **The machine has been unused for a period on time and the blower was not properly lubricated when it was shut down, causing rust to build up on internal surfaces.** Spray penetrating oil into blower inlet and let sit for at least one hour. Then *very carefully* use pipe wrench on outer diameter of pulley on blower shaft and attempt to free up blower. *Do not use wrench directly on blower shaft.* If unable to free up blower in this manner, refer to qualified service technician.
 - 5.2. **There is internal damage to the blower.** Refer to qualified service technician.
-

Miscellaneous Troubleshooting

1.0. Water from exhaust

1.1. **The recovery tank has been filled with foam or overfilled with water.** Remove recovery tank lid and inspect. If full, drain tank then inspect high-level shutoff switch for proper operation. Clean or replace switch as necessary.

1.1.1. If foam is observed in recovery tank, use defoamer on carpet being cleaned.

1.2. **Condensation.** This will be more pronounced in cool weather and humid climates. Observe how long this condition persists after starting machine. If it is only until the machine warms up, it is normal.

1.3. **A heat exchanger is leaking.** Change the diverter mode switch back and forth between Divert and Heat Exchange mode. Observe which condition causes water to be expelled from exhaust.

1.3.1. If water is expelled while switch is in Heat exchange mode, the engine exhaust afterburner heat exchanger is leaking internally. Remove and test. Replace as necessary.

1.3.2. If water is expelled while switch is in Divert mode, the blower exhaust heat exchanger is leaking. Remove and test. Replace as necessary.

Engine Troubleshooting

MAXX 450D/470D/450 Diesel

Section 9-1

1.0. Will not turn over

- 1.1. **The circuit breaker on the wiring panel has tripped.** This switch resets automatically. Remove wires and test for continuity. If the breaker *does* reset, inspect the unit to determine the cause of the tripped breaker. If the breaker *does not* reset, replace after wiring has been inspected.
- 1.2. **There is a loose or corroded battery terminal.** Clean and tighten the battery terminal connections.
- 1.3. **The battery is dead.** Recharge or replace the battery. Test the charging system. Repair if necessary. *WARNING: Do not jump-start this machine from a running vehicle. The amperage output from an automobile will damage the charging system of the truck mount.*
- 1.4. **There is a problem with the starter solenoid.** If there is 12 volts at the battery connection and at the key switch connection with the key in the start position, but there is not 12 volts on the starter connection of the solenoid, replace the solenoid.
- 1.5. **The ignition switch is defective.** Test to see if there is 12 volts to the switch. If there is, but there is not 12 volts coming from the switch, replace the switch.
- 1.6. **The vacuum blower has seized.** Refer to Vacuum section II, 5.0.
- 1.7. **The starter motor is defective.** Check to see if the engine can be turned over by hand. If it can and if there is 12 volts from the starter solenoid to the starter, replace the starter.
- 1.8. **There is a mechanical problem with the engine.** If the engine can not be turned over by hand and the vacuum blower is not locked up, refer the engine to a qualified service technician to determine the cause of the problem.

2.0. Turns over but will not start. There is spark

(Note: To check for spark, use the following procedure. Remove a spark plug from the engine. Attach the lead wire back onto the plug. Ground the threaded part of the spark plug to an unpainted engine surface. While holding the plug and wire assembly by the insulated wire, crank the engine over by turning the ignition switch to the "start" position. You should observe a blue spark between the two electrodes of the spark plug.)

- 2.1. **Recovery tank is full.** Empty the tank.
- 2.2. **Recovery tank float is defective.** Disconnect float. If engine starts, replace the float.
- 2.3. **The high temperature shut-down function of the temperature controller has shut the engine down.** Observe the temperature gauge. If it appears above normal operating range (250° or higher) allow the machine to cool down. If it will still not start, refer to a qualified service technician to have the temperature controller tested.
 - 2.3.1. If the machine starts after it has cooled down, refer to the Heating System section, IV, 1.0.
- 2.4. **The engine overheat switch has activated and caused the engine to shut down.** Allow the engine to cool down and inspect the engine coolant level. If the coolant level is low, inspect cooling system for leaks and repair as necessary before adding coolant. If the coolant level is normal, remove the wire from the engine overheat switch. If the engine starts with the wire removed, replace the switch.
- 2.5. **The spark plugs are faulty.** Remove and inspect. Replace if necessary.
- 2.6. **Fuel is not reaching the carburetor inlet.** Check the fuel pump. If it is working, check to see if the pump is delivering 12 oz / minute flow to the carburetor.
 - 2.6.1. If it is not, inspect the fuel lines between the pump and the carburetor. Also make sure the pump is mounted vertically and close to the fuel source. Repair or replace any faulty parts as necessary.
 - 2.6.2. If the pump is not working, check for 12 volts and a ground at the pump.
 - 2.6.3. If 12 volts is not present at the pump, check the wiring to the pump, including the fuse. Repair or replace as necessary. Note: If the fuse has blown, carefully inspect the wiring for a damaged wire. Repair immediately.
 - 2.6.4. If 12 volts is present at the pump and the ground is good, replace the pump.
- 2.7. **The carb solenoid is malfunctioning.** Test for 12 volts and proper ground at solenoid. If both test okay, replace the solenoid.
- 2.8. **The engine is flooded.** Wait for a few minutes and attempt to start with the choke open. Note: If the engine has been flooded, it may be necessary to remove and clean the spark plugs.
 - 2.8.1. Check for proper operation of the choke (manual or automatic). Make sure it is opening properly.
- 2.9. **There is a mechanical problem with the engine.** Have engine inspected by a qualified engine service technician.

3.0. Turns over but will not start. There *is no spark*

- 3.1. **The 15 amp fuse is blown.** Check the fuse. If it is blown, inspect the wiring for a wire shorted to ground. Repair as necessary.
 - 3.2. **There is a loose or broken wire.** Check all wiring to the ignition processor and to the three ignition coils. Repair as necessary.
 - 3.3. **The engine ignition system is malfunctioning.** Refer to a qualified engine service technician for inspection.
-

4.0. Will not come up to medium or high RPM

- 4.1. **The speed control switch is defective.** Check switch for continuity between posts. Replace as necessary.
 - 4.2. **The speed control fuse is blown.** Check the fuse. If it is blown, inspect the wiring for damaged wire. Repair as necessary.
 - 4.3. **The engine has been overrevved.** Turn ignition switch off and back on to reset the overrev safety function.
 - 4.4. **The speed control governor or the throttle actuator is faulty.** Refer to qualified service technician for diagnosis and repair.
 - 4.5. **There is excessive back-pressure on the engine or blower exhaust.** Check for clogged blower heat exchanger.
-

5.0. Runs rough at medium or high RPM

- 5.1. **A spark plug is defective.** Remove and inspect spark plugs. Replace as necessary.
 - 5.2. **A spark plug wire is loose on the spark plug or has been damaged.** Check for loose or damaged wire. Replace wire as necessary.
 - 5.3. **Poor spark on one or more cylinders.** Ignition system is faulty. Refer to qualified engine service technician for diagnosis and repair.
 - 5.4. **Inadequate fuel supply to the carburetor.** Test the fuel volume at the carburetor by removing the fuel line from the carburetor inlet and placing the line in a metal container with a capacity of at least 16 ounces. It should be 12 oz / minute. Check for clogged filter or obstructed fuel line. Also check to make sure the fuel pump is mounted vertically and is close to the fuel source. Repair as necessary.
-

- 5.5. **Low compression on one or more cylinders.** Check compression. If low, check valve adjustment. If incorrect, adjust to proper specs. This operation should be performed by an experienced service technician. If adjustment is okay, there is a possibility of burned valves, burned head gasket or worn cylinders. Refer to qualified engine service technician.
-

6.0.Runs rich (Black smoke)

- 6.1. **Dirty air filter.** Inspect and replace as necessary.
- 6.2. **Choke is partially closed.** Inspect choke for proper operation. Repair as necessary.
- 6.3. **Excessive fuel to carburetor.** Insure that fuel pump is proper PSI rating. A fuel pump with a psi rating in excess of that of the pump supplied with the machine could overpower the inlet valve in the carburetor, causing excessive fuel to be supplied to the carburetor.
- 6.3.1. There is dirt in the carburetor, causing the carburetor inlet valve to be held open. Refer to qualified engine service technician.
- 6.4. **One or more safety switch is attempting to shut down machine.** Isolate each safety switch, one at a time. If one switch is found to cause the problem, first check to see if there is a problem with the machine causing the switch to activate.
- 6.4.1. If no problem is found, replace the switch.
-

7.0.Engine loses RPM and misses, but doesn't die

- 7.1. **The machine fuel line has a vapor lock.** Remove the fuel line from the carburetor inlet and check for air in line. *Caution: Do not let fuel contact hot engine surfaces!* If air is observed, let the machine cool off and check for condition that would cause a vapor lock situation.
- 7.2. **The fuel pump is mounted incorrectly.** Check to make sure the pump is mounted vertically and is close to the fuel source. Repair as necessary.

8.0. Engine overheats

- 8.1. **Poor ventilation in vehicle.** All cargo area doors must be open for proper ventilation. Roof vents are strongly recommended for machines that are operated in hot climates. Any item that might restrict air flow to the machine such as other equipment or a solid divider between cargo and passenger areas should be moved or modified to permit proper air flow.
- 8.2. **Low engine coolant level.** Check coolant level. If low, check for source of leak and repair before replenishing coolant.
- 8.3. **Fan belt loose or broken.** Check belt. Adjust or replace as necessary.
- 8.4. **Engine coolant thermostat is stuck closed.** Remove thermostat and test. Replace as necessary.
- 8.5. **Radiator is clogged with debris.** Inspect radiator. Clean as necessary.
- 8.6. **Low engine oil level.** Check oil level and replenish as necessary.
- 8.7. **Engine RPM too high.** Check RPM with an accurate tachometer. Adjust as necessary.
- 8.8. **Restricted engine or blower exhaust.** Disassemble exhaust components to locate restriction. Repair as necessary.

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Electrical System

MAXX 450D/470D/450 Diesel

Section 10-1

The MAXX electrical system has been specifically designed with the technician in mind. Often the most difficult problem to trace is an electrical failure.

The MAXX series of machines utilizes a wiring Diagnostic Status Center which allows the technician or mechanic to trace all the electrical circuits from the front of the machine.

The electronic governor and ignition processor has a built-in troubleshooting control. It is labeled "Engine Diagnostic" on the status panel. Refer to the Daihatsu engine troubleshooting section for this feature.

The entire electrical system operates on 12 volts DC which is provided by a battery. Battery levels are sustained by a 40 amp alternator inside the engine.

NOTE: When a new battery is installed, check that it is properly charged before installation or damage to the charging regulator may occur.



Make sure the diodes are replaced in the same position as removed. See Schematic.



Always replace a blown fuse with another of the same amperage rating.

Figure 10-1 Wiring Schematic - 450D and 470D
D-4380 Rev F

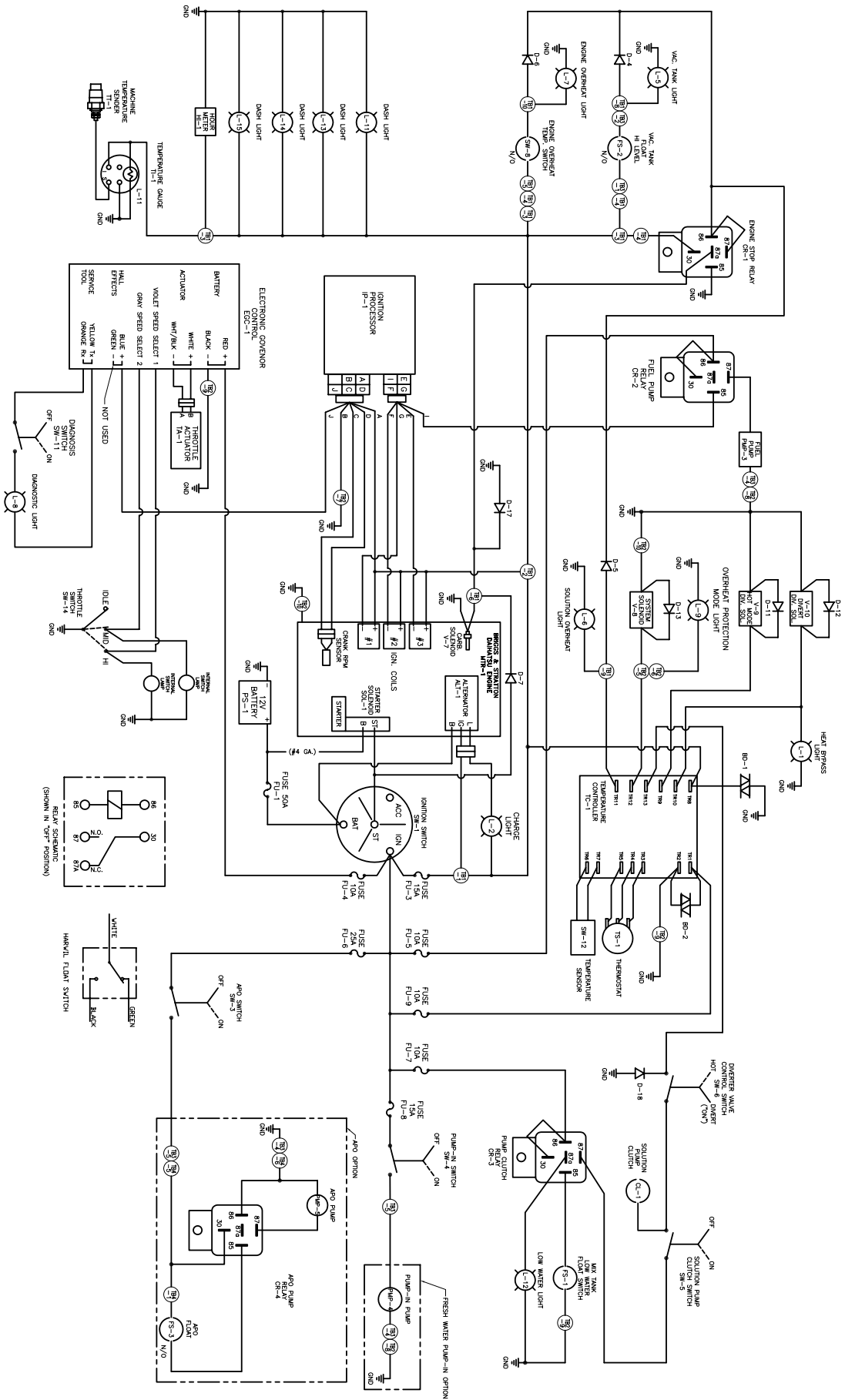


Figure 10-2 Wiring Diagram- 450D & 470D
D-4381 Sht 2, Rev K

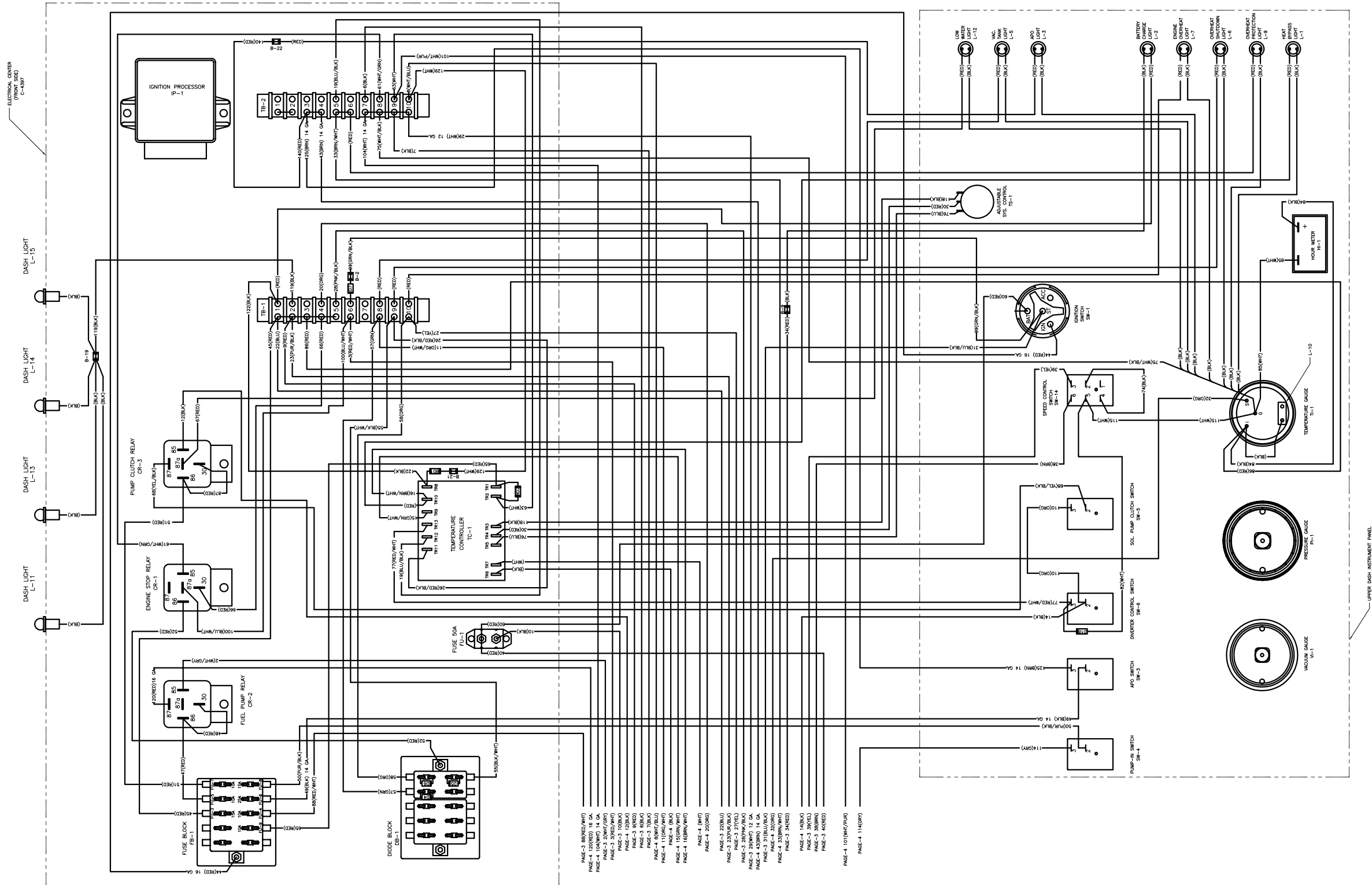


Figure 10-3 Wiring Diagram- 450D & 470D
D-4381 Sht 3, Rev K

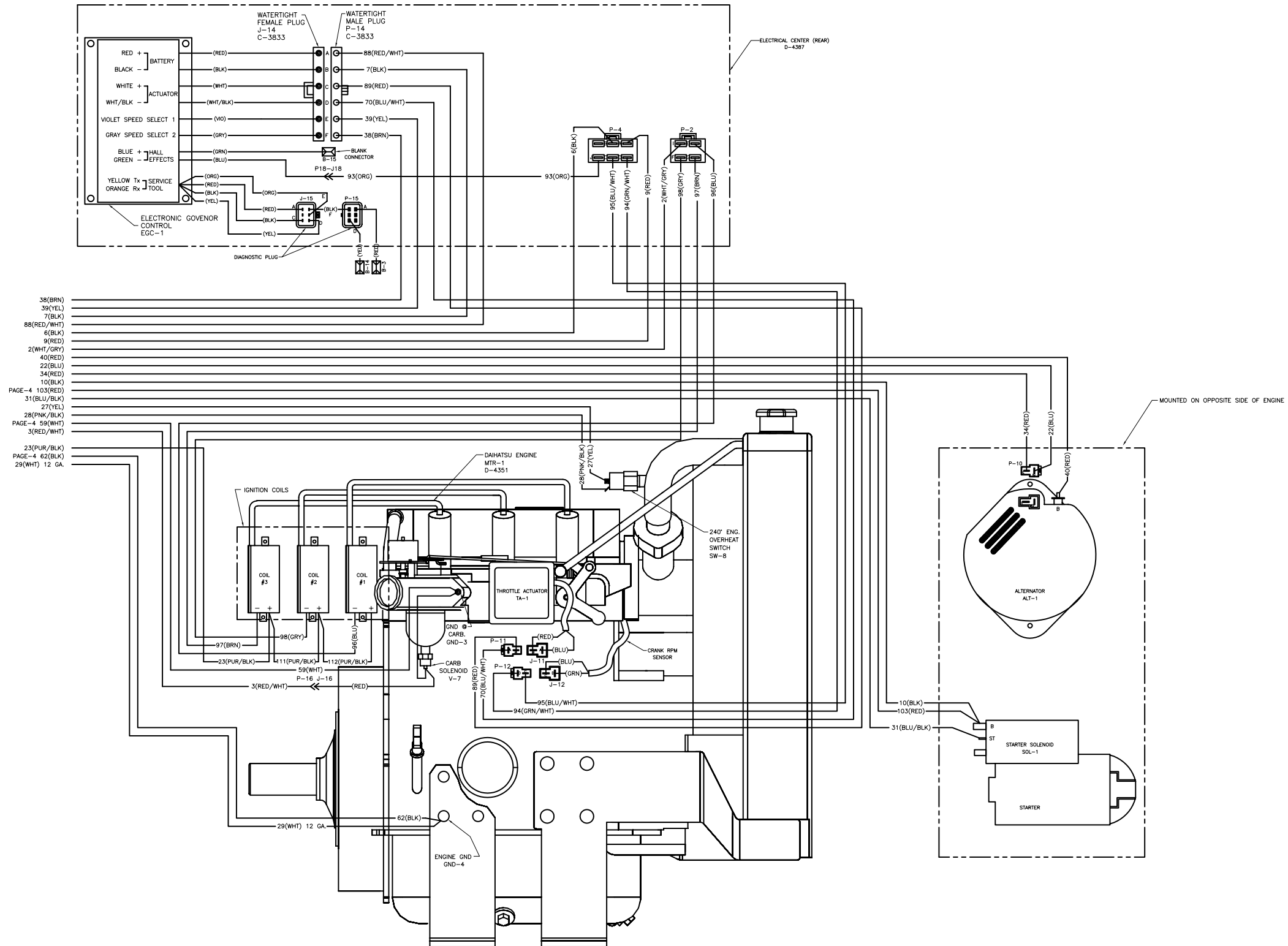
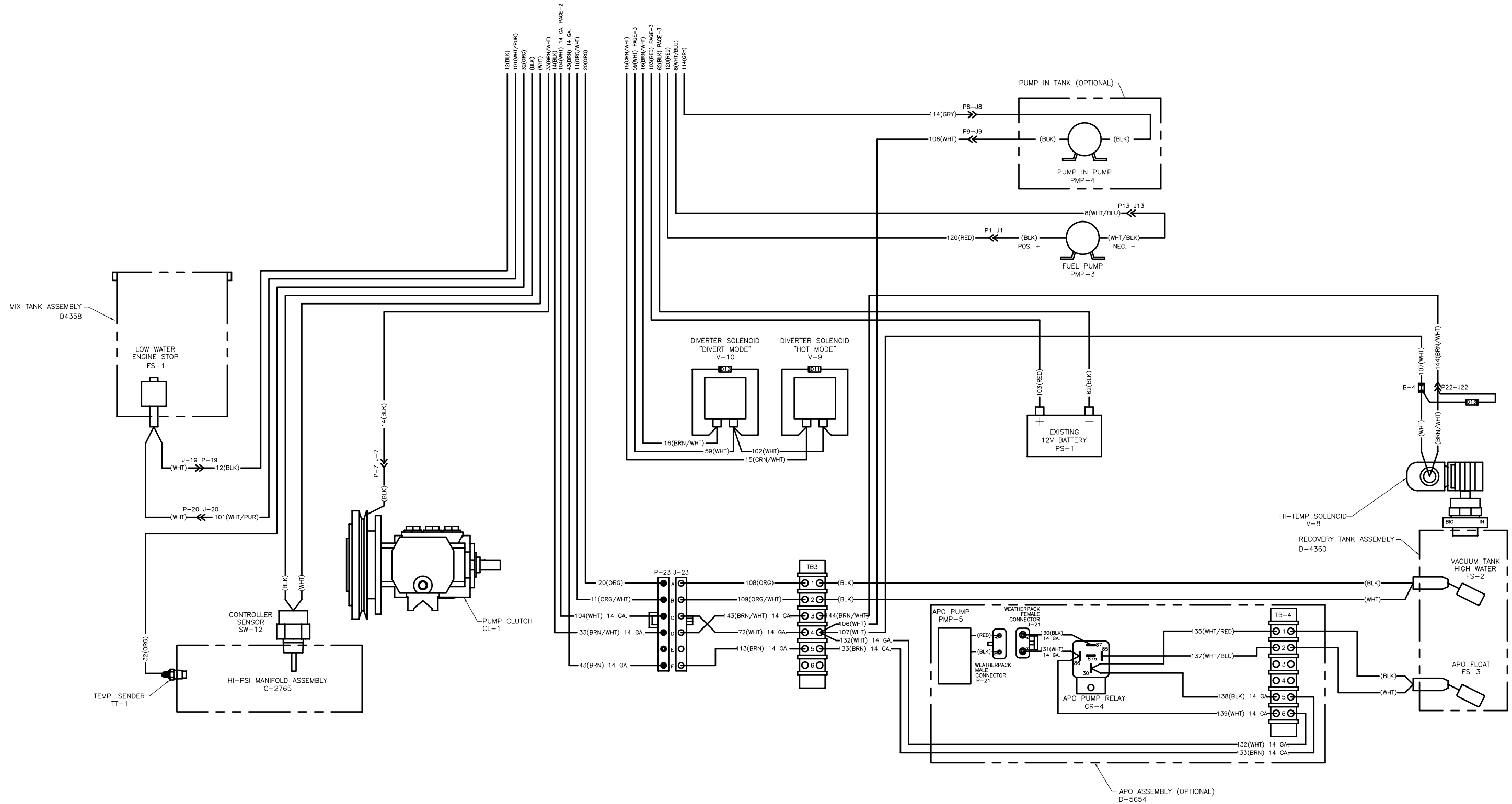


Figure 10-4 Wiring Diagram- 450D & 470D
D-4381 Sht 4, Rev K



Machine Maintenance

MAXX 450D/470D/450 Diesel

Section 11-1

To avoid costly repairs and down-time, it is imperative to develop and practice good maintenance procedures from the beginning. These procedures fall into daily, weekly, monthly and quarterly increments, and are outlined below. All recommended maintenance must be performed by competent service personnel.

Important: Record the date and machine hours on the maintenance log.

We have provided a maintenance log for your convenience at the end of this section. The symbol means to see this General Maintenance Log for specific maintenance intervals. *Records of maintenance must be kept and copies may be required to be furnished to HydraMaster before the warranty is honored.* It is recommended that you affix a copy of the Log on the vehicle door near your unit for convenience and to serve as a maintenance reminder.

OPERATIONAL MAINTENANCE

DAILY

1. Visually inspect machine for loose wires, oil leaks, water leaks, etc.
2. Check engine oil level. Add as needed.
3. Inspect garden hose screen. Clean as needed.
4. Inspect recovery tank s/s filter and filter bag for tears, holes, etc.
Clean, repair or replace as needed.
5. Lubricate blower with an oil based lubricant through blower inlet.
6. Check coolant. Add as necessary.
7. Inspect fuel, oil, and coolant lines for leakage.

OPERATIONAL MAINTENANCE (cont.)

WEEKLY

1. One time change of oil and oil filter **after first 20 hours** of use.
2. One time check of the belt tensioning **after first 25 hours** of use.
3. Check the oil level in blower.
4. Check the high pressure pump oil. Add as necessary.
5. Check the drive system screws. Tighten as needed.
6. Check the pump drive belt for wear.
7. Check the pump pulleys for wear.
8. Check the high pressure water lines for wear or chafing.
9. Check all nuts and bolts. Tighten as needed.
10. Clean foam element in air cleaner.
11. Inspect vacuum relief valve. Clean and lubricate as necessary.
12. Clean vacuum tank thoroughly with high pressure washer.
13. Check the wiring for any chafing.
14. Flush water and chemical system with 50/50 white vinegar solution.
15. Check float switches for debris.

MONTHLY

1. Change the engine oil regularly.
2. Clean the engine air cleaner filter.
3. Remove pressure Bypass Valve piston plate. Grease plate. Reinstall.
4. Check water level in the battery. Clean connections as needed.
5. Clean incoming adapter filter.
6. Clean the water box solenoid filter.
7. Clean control orifice and secondary orifice filters.
8. Inspect the primary and the secondary orifice.
9. Change the oil filter every 2 months.
10. Inspect the radiator and hoses every 2 months.
11. Check the belt tensioning every 2 months.
The poly-chain drive system is approx. ¼" deflection with 8 to 9 lbs of force, measured at midspan.

OPERATIONAL MAINTENANCE (cont.)

QUARTERLY

1. Change paper element in air cleaner.
2. Check fuel lines.
3. Clean and gap spark plugs.
4. Change coolant.
5. Grease blower bearing fittings.
6. Change oil in blower.
7. Change oil in pump.

SEMI-ANNUALY

1. Inspect chemical pump diaphragm and check valves for wear.

DE-SCALING (As Required)

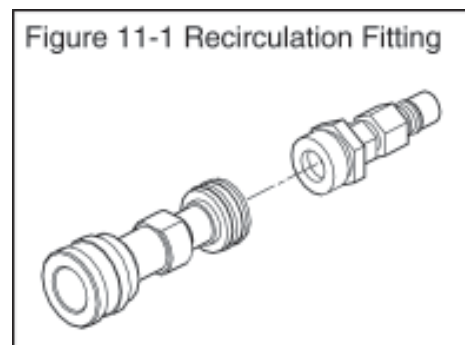
Scale deposits on the interior of the heating system can cause a noticeable loss in heating performance. Deposits of this kind result from hard water deposits, excessive chemical use, improper chemicals, etc. The frequency with which de-scaling procedures are required will vary. If your area has particularly hard water or you see evidence of deposits in the water system, you may have to de-scale monthly.

To de-scale your system, add an appropriate de-scaler chemical to your water box. Circulate it through the heating system. Let it stand. Flush and repeat as necessary. Clean all screens and strainers, and check them frequently following de-scaling.

NOTE: If you are using T.M. DeScaler through the flow meter, make sure to run clean water through the flow meter after this procedure.

To de-scale using the recirculation kit, start with an empty water box. Fill a third of the water box with T.M. DeScaler. Follow the recommendations on the T.M. DeScaler label for proportions. Verify that the upper float is not lying horizontal, but floats below.

Attach the recirculation fitting provided in the kit to the garden hose quick connect (see illustration to right) and this combination to the front of the machine.



DE-SCALING (cont.)

Attach one section of female/female solution hose to the outgoing solution fitting on the front of the machine and the other end to the garden hose and recirculation fitting combination that is attached to the front of the machine (or as many sections as you want, if you wish to de-scale your hoses).

Start the machine and allow it to run for three to five minutes. Depress the freeze guard button and hold for 30 seconds. Do not leave the T.M. DeScaler solution in the system. Flush the system with clean water and turn the machine "OFF".

OVERALL MACHINE MAINTENANCE

Maintaining the original appearance of your unit is important for two reasons:

1. It represents a big dollar investment for your cleaning business and its appearance should reflect that fact. A dirty machine is not professional.
2. Maintenance, troubleshooting, and repair is much easier to accomplish on a clean, well maintained unit. Regular cleaning of the machine offers you an opportunity to visually inspect all facets of the machine and spot potential problems before they occur.

The following maintenance is recommended by the manufacturer at the frequency indicated.

AFTER EACH JOB

1. Check recovery tank, stainless steel filter and filter bag as required.

DAILY

1. Wipe machine down thoroughly with a damp cloth.
2. Flush recovery tank out thoroughly.
3. Empty filter bag and inspect for rips, tears, etc. Replace as needed.
4. Remove, thoroughly clean and reinstall stainless steel filter screen in recovery tank.
5. Inspect and clean vacuum slot on cleaning wand.

OVERALL MACHINE MAINTENANCE (cont.)

6. Check wand head for sharp edges that could tear carpet. File down as needed.
7. Clean wand to maintain original appearance.
8. Wipe down vacuum and high pressure hoses as needed.
9. Visually inspect hoses for cuts, etc.

WEEKLY

1. Wipe down entire unit as needed.
2. Apply good coat of auto wax to all painted surfaces inside and out, and to control panel.
3. Thoroughly clean recovery tank using high pressure hot water (unit with optional high pressure cleaning gun may be used for this).
4. Remove stainless steel filter in recovery tank and thoroughly clean, removing all lint build-up. Inspect for damage and reinstall.
5. Remove filter bag. Thoroughly clean and reinstall. If torn, replace.
6. Empty chemical from chemical container. Wash out thoroughly to remove any chemical build-up.
7. Inspect chemical feed line strainer and use 50% white vinegar/water solution to remove any chemical build-up.
8. Thoroughly clean wand and inspect for clogged jet, debris in vacuum slot and leaking fittings at valve.
9. Apply light coat of auto wax to wand.
10. Thoroughly clean vacuum and high pressure hoses including hose cuffs.
11. Inspect for wear or damage to hoses and quick connect fittings.
12. Inspect garden hose connect/adapter screen for debris. Remove and clean thoroughly.
13. Inspect all lines for wear or abrasions that may cause possible leaks.

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MAXX 450D/470D/DIESEL GENERAL MAINTENANCE LOG

MAX HRS	DAILY SERVICE	OIL RECOMMENDATIONS						
8	ENGINE OIL check	BLOWER	40 weight non-detergent					
8	GARDEN HOSE SCREEN clean	PUMP	5 - 30 weight synthetic motor oil					
8	MACHINE general inspection	ENGINE	30 weight motor oil					
8	RECOVERY TANK FILTER BAG clean		NOTE: Overhead valve engines can use multi-viscosity oil, but will experience increased oil consumption.					
8	BLOWER INLET spray with lubricant							
	WEEKLY SERVICE	DATE & HOURS						
See Note	OIL change with filter		Note: Break-in period determined by manufacturer. Reference engine manual.					
25	BELTS check tension		Break-in. One time only.					
25	BLOWER check oil level							
25	PUMP OIL check							
25	DRIVE SYSTEM tighten screws							
25	BELTS & PULLEYS check for wear							
25	HIGH PRESSURE LINES check for chafing							
25	NUTS & BOLTS check tightness							
25	"Y" FILTER check and clean							
25	ORIFICE inspect							
25	VACUUM RELIEF VALVE inspect, clean, lube							
25	VACUUM TANK clean							
25	WIRING check for chafing							
25	CHEMICAL SYSTEM flush with vinegar							
25	FLOAT SWITCHES check for debris							
	MONTHLY SERVICE							
100	ENGINE OIL change							
100	ENGINE AIR CLEANER clean							
100	BY-PASS VALVE grease piston and o-rings							
100	BATTERY WATER LEVELS check							
200	OIL FILTER change							
200	BELTS check tension							
	QUARTERLY SERVICE (3 MONTHS)							
300	FUEL LINES check for wear							
300	SPARK PLUGS clean and gap							
400	BLOWER grease bearing							
400	BLOWER OIL change							
400	PUMP OIL change							
500	CHEMICAL PUMP inspect							
500	CHEM. PUMP DIAPHRAGM check for wear							
500	CHEMICAL PUMP VALVES check for wear							
500	WATER BOX FLOAT VALVE Remove stem and lubricate							
500	AIR CYLINDER Remove fittings and lubricate with light oil.							
500	DIESEL FUEL FILTER- change							

How to Order Parts

MAXX 450D/470D/450 Diesel

Section 12-1

To obtain a proper diagnosis of your malfunction, and to order warranty replacement parts or repairs, it is important that you proceed in the following manner:

WARRANTY PARTS ORDERS

1. Call the local distributor where you purchased your equipment and ask for the Service Department.
2. Have the following information ready:
 - A. Equipment Model
 - B. Date of Purchase
 - C. Hours on the Unit
 - D. Unit Serial Number
 - E. Description of Malfunction
3. Once it has been determined which parts are needed to correct the problem with your machine, make arrangements with your distributor to either perform the repairs or ship the parts to you.

PARTS ORDERS

Call your local distributor. In most instances, they either stock or have access to parts through a regional service center.

EMERGENCIES

If, for any reason, your distributor is unable to supply you with the necessary parts, they may call us and arrange for expedited shipping.

HydraMaster sells parts only through authorized distributors and service centers.

ONE FINAL NOTE...

Any questions you have regarding the warranty program should be directed to the Customer Service Department at (425) 775-7275, 8 a.m. to 5 p.m. Monday through Friday (PST).

We shall always endeavor to be fair in our evaluation of your warranty claim, and shall provide you with a complete analysis of our findings.

HydraMaster warranty covers only defective materials and/or workmanship for the periods listed. **Labor and/or diagnostic reimbursement is specifically excluded.**

Warranty Information

MAXX 450D/470D/Diesel
Section 13-1

To avoid misunderstandings which might occur between machine owners and manufacturer, we are listing causes of component failure that specifically voids warranty coverage. Such causes as listed below shall constitute **abuse** or **neglect**.

BLOWER:

- Failure to lubricate impellers daily with an oil based lubricant.
- Failure to lubricate bearings as recommended in blower manual.
- Failure to maintain proper oil levels in the blower.
- Failure to use the correct oil grade and viscosity as recommended in blower manual.
- Failure to properly maintain blower safeguard systems such as waste tank filter screen, vacuum safety relief valve and waste tank automatic shut-off system.
- Allowing foam to pass through blower.

HIGH PRESSURE WATER PUMP:

- Failure to maintain proper oil level as recommended in pump manual.
- Failure to change oil in pump at recommended intervals.
- Failure to protect pump against freezing.
- Failure to maintain pump protection shut-off system.
- Failure to use water softener in hard water areas.
- Use of improper chemicals.

VACUUM TANK:

- Failure to properly maintain filtering devices in tank.
- Failure to clean tank as recommended by manufacturer.
- Failure to maintain vacuum safety release in tank.
- Use of improper chemicals.

CHEMICAL SYSTEM:

- Use of improper chemical.
- Failure to use water softener in hard water area.
- Operating machine without proper chemical filter screen.
- Failure to protect against freezing.

CONTROL PANEL:

- Failure to protect flowmeter and water pressure gauge against freezing.

VACUUM AND SOLUTION HOSES:

- Failure to protect hoses against freezing.
- Failure to protect hoses against burns from engine and blower exhaust.
- Damage to hoses from being run over by vehicles.
- Kinking or cracking from failure to store or unroll hoses correctly.
- Normal wear and tear from everyday use.

CLEANING WAND:

- Failure to protect against freezing.
- Obvious physical abuse of wand.

WATER HEATING SYSTEM:

- Over-pressurization of the system (recommended maximum working pressure-1,000 PSI).
- Failure to protect against freezing.

HARD WATER DEPOSITS:

- Failure to use or maintain a water softening system or a properly installed magnetic-type de-scaler, whichever might be necessary, with machines operating in designated "Hard Water Areas" (3.5 grains or more per gallon).

WARRANTY PROCEDURE

Warranty coverage is available to you through *your local Distributor*.

If you have moved to a new area or have purchased a used machine and need information regarding your local distributor, call HydraMaster at (425) 775-7272 or email us at custsvc@hydramaster.com.

When calling your distributor, be sure to have the machine's information; model and serial number, ready for the service representative.

IMPORTANT: HydraMaster's warranty policy provides replacement parts without charge for thirty (30) days to distributors maintaining current account status. An invoice will be sent to the distributor for the amount of the parts sent. The customer's faulty parts **must be** returned for evaluation prior to the expiration of the thirty (30) day period. Upon warranty approval, a credit will be issued the distributor for the replacement parts invoice. **Warranty disapproval or failure to return the faulty parts within the thirty (30) day period allowed will result in the customer being charged for the replacement parts sent.**

FOR YOUR REFERENCE:

Model No. _____
Serial No. _____
Date of Purchase: _____
Purchased From (Distributor): _____

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Accessories

MAXX 450D/470D/450 Diesel

Section 14-1

Genuine HydraMaster Accessories & Detergents

This section of your Owners Manual is devoted to Accessories and Detergents which we have found to be helpful and useful. *These products can enhance your cleaning and reduce your labor costs!*

HydraMaster Machine accessories are the most innovative collection available in the cleaning industry. Our patented **RX-20 Rotary Extractors** have changed the shape of steam cleaning. Our hoses and tanks are of the finest quality construction.

SafeClean and HydraMaster Detergents have been specially prepared, not only to give you exceptional cleaning, but also to optimize your truckmount's operation and reliability. *Most detergents don't work well under the high heat, high pressure conditions of truckmount use.* **SafeClean and HydraMaster** will maintain your machines's water pump and water heating systems at peak efficiency and help ensure fewer breakdowns.

***For more information, or to order Genuine
HydraMaster Accessories and Detergents
Call your nearest authorized HydraMaster Distributor.***

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Product Support Bulletins

MAXX 450D/470D/450 Diesel

Section 15-1